

AMENDATORY SECTION (Amending Order 94-07, filed 7/20/94, effective 9/20/94)

WAC 296-24-33005 Tank storage. (1) Design and construction of tanks.

(a) Materials.

(i) Tanks shall be built of steel except as provided in (1)(a)(ii) through (v) of this section.

(ii) Tanks may be built of materials other than steel for installation underground or if required by the properties of the liquid stored. Tanks located above ground or inside buildings shall be of noncombustible construction.

(iii) Tanks built of materials other than steel shall be designed to specifications embodying principles recognized as good engineering design for the material used.

(iv) Unlined concrete tanks may be used for storing flammable or combustible liquids having a gravity of 40°API or heavier. Concrete tanks with special lining may be used for other services provided the design is in accordance with sound engineering practice.

(v) Tanks may have combustible or noncombustible linings.

(vi) Special engineering consideration shall be required if the specific gravity of the liquid to be stored exceeds that of water or if the tanks are designed to contain flammable or combustible liquids at a liquid temperature below 0°F.

(b) Fabrication.

(i) Tanks may be of any shape or type consistent with sound engineering design.

(ii) Metal tanks shall be welded, riveted, and caulked, brazed, or bolted, or constructed by use of a combination of these methods. Filler metal used in brazing shall be nonferrous metal or an alloy having a melting point above 1000°F and below that of the metal joined.

(c) Atmospheric tanks.

(i) Atmospheric tanks shall be built in accordance with acceptable good standards of design. Atmospheric tanks may be built in accordance with:

(A) Underwriters' Laboratories, Inc., Subjects No. 142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, 1968; No. 58, Standards for Steel Underground Tanks for Flammable and COMBUSTIBLE Liquids, Fifth Edition, December 1961; or No. 80, Standard for Steel Inside Tanks for Oil-Burner Fuel, September 1963.

(B) American Petroleum Institute Standards ((No. 12A,

~~Specification for Oil Storage Tanks with Riveted Shells, Seventh Edition, September 1951, or~~) No. 650, Welded Steel Tanks for Oil Storage, Third Edition, 1966.

(C) American Petroleum Institute Standards No. 12B, Specification for Bolted Production Tanks, Eleventh Edition, May 1958, and Supplement 1, March 1962; No. 12D, Specification for Large Welded Production Tanks, Seventh Edition, August 1957; or No. 12F, Specification for Small Welded Production Tanks, Fifth Edition, March 1961. Tanks built in accordance with these standards shall be used only as production tanks for storage of crude petroleum in oil-producing areas.

(ii) Tanks designed for underground service not exceeding 2,500 gallons capacity may be used aboveground.

(iii) Low-pressure tanks and pressure vessels may be used as atmospheric tanks.

(iv) Atmospheric tanks shall not be used for the storage of a flammable or combustible liquid at a temperature at or above its boiling point.

(d) Low pressure tanks.

(i) The normal operating pressure of the tank shall not exceed the design pressure of the tank.

(ii) Low-pressure tanks shall be built in accordance with acceptable standards of design. Low-pressure tanks may be built in accordance with:

(A) American Petroleum Institute Standard No. 620, Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks, Third Edition, 1966.

(B) The principles of the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessels Code, 1968.

(iii) Atmospheric tanks built according to the Underwriters' Laboratories, Inc., requirements in (1)(c)(i) of this section may be used for operating pressures not exceeding 1 p.s.i.g. and shall be limited to 2.5 p.s.i.g. under emergency venting conditions. Pressure vessels may be used as low-pressure tanks.

(e) Pressure vessels.

(i) The normal operating pressure of the vessel shall not exceed the design pressure of the vessel.

(ii) Pressure vessels shall be built in accordance with the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code, 1968.

(f) Provisions for internal corrosion. When tanks are not designed in accordance with the American Petroleum Institute, American Society of Mechanical Engineers, or the Underwriters' Laboratories, Inc.'s standards, or if corrosion is anticipated beyond that provided for in the design formulas used, additional metal thickness or suitable protective coatings or linings shall be provided to compensate for the corrosion loss expected during

the design life of the tank.

(2) Installation of outside aboveground tanks.

(a) Location with respect to property lines and public ways.

(i) Every aboveground tank for the storage of flammable or combustible liquids, except those liquids with boil-over characteristics and unstable liquids, operating at pressures not in excess of 2.5 p.s.i.g. and equipped with emergency venting which will not permit pressures to exceed 2.5 p.s.i.g. shall be located in accordance with Table H-5.

(ii) Every aboveground tank for the storage of flammable or combustible liquids, except those liquids with boil-over characteristics and unstable flammable or combustible liquids, operating at pressures exceeding 2.5 p.s.i.g. or equipped with emergency venting which will permit pressures to exceed 2.5 p.s.i.g. shall be located in accordance with Table H-6.

(iii) Every aboveground tank for the storage of flammable or combustible liquids with boil-over characteristics shall be located in accordance with Table H-7.

(iv) Every aboveground tank for the storage of unstable liquids shall be located in accordance with Table H-8.

(v) Reference minimum distances for use in Tables H-5 to H-8 inclusive.

(vi) Where end failure or horizontal pressure tanks and vessels may expose property, the tank shall be placed with the longitudinal axis parallel to the nearest important exposure.

TABLE H-5

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building and shall be not less than 5 feet.
Floating roof	Protection for exposures.	1/2 times diameter of tank but need not exceed 90 ft.	1/6 times diameter of tank but need not exceed 30 ft.
	None	Diameter of tank but need not exceed 175 ft.	1/6 times diameter of tank but need not exceed 30 ft.
Vertical with weak roof to shell seam	Approved foam or inerting system on the tank.	1/2 times diameter of tank but need not exceed 90 ft. and shall not be less than 5 ft.	1/6 times diameter of tank but need not exceed 30 ft.
	Protection for exposures.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.

	None	2 times diameter of tank but need not exceed 350 ft.	1/3 times diameter of tank but need not exceed 60 ft.
Horizontal and vertical, with emergency relief venting to limit pressures to 2.5 p.s.i.g.	Approved inerting system on the tank or approved foam system on vertical tanks.	1/2 times Table H-9 but shall not be less than 5 ft.	1/2 times Table H-9.
	Protection for exposures.	Table H-9	Table H-9
	None	2 times table	Table H-9

TABLE H-6

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
Any type	- Protection for exposures.	1 1/2 times Table H-9 but shall not be less than 25 ft.	1 1/2 times Table H-9 but shall not be less than 25 ft.
	None	3 times Table H-9 but shall not be less than 50 ft.	1 1/2 times Table H-9 but shall not be less than 25 ft.

TABLE H-7

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
Floating roof	Protection for exposures.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	None	2 times diameter of tank but need not exceed 350 ft.	1/3 times diameter of tank but need not exceed 60 ft.
Fixed roof	Approved foam or inerting system.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	Protection for exposures.	2 times diameter of tank but need not exceed 350 ft.	2/3 times diameter of tank but need not exceed 120 ft.
	None	4 times diameter of tank but need not exceed 350 ft.	2/3 times diameter of tank but need not exceed 120 ft.

TABLE H-8

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
Horizontal and vertical tanks with emergency relief venting to permit pressure not in excess of 2.5 p.s.i.g.	Tank protected with any of the following: Approved water spray, approved inerting, approved insulation and refrigeration, approved barricade.	See Table H-9, but the distance may be not less than 25 ft.	Not less than 25 ft.
	Protection for exposures.	2 1/2 times Table H-9 but not less than 50 ft.	Not less than 50 ft.
	None ———	5 times Table H-9 but not less than 100 ft.	Not less than 100 ft.
Horizontal and vertical tanks with emergency relief venting to permit pressure over 2.5 p.s.i.g.	Tank protected with any one of the following: Approved water spray, approved inerting, approved insulation and refrigeration, approved barricade.	2 times Table H-9 but not less than 50 ft.	Not less than 50 ft.
	Protection for exposures.	4 times Table H-9 but not less than 100 ft.	Not less than 100 ft.
	None ———	8 times Table H-9 but not less than 150 ft.	Not less than 150 ft.

TABLE H-9

Capacity tank gallons	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
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275	or ———	5
	le ———	
	ss — 5	
276	to 750 —	5
	—	
	—	
	—	
	1	
	0	
751	to 12,0 —	5
	00 —	
	—	
	—	
	1	
	5	
12,001	to 30,0 —	5
	00 —	
	—	
	—	
	2	
	0	
30,001	to 50,0 —	10
	00 —	
	—	
	—	
	3	
	0	
50,001	to 100, —	15
	000 —	
	—	
	—	
	5	
	0	
100,001	to 500, —	25
	000 —	
	—	
	—	
	8	
	0	
500,001	to 1,00 —	35
	0,00 —	
	0 —	
	-	
	1	
	0	
	0	
1,000,001	to 2,00 —	45
	0,00 —	
	0 —	
	-	
	1	
	3	
	5	
2,000,001	to 3,00 —	55
	0,00 —	
	0 —	
	-	
	1	
	6	
	5	
3,000,001	or ———	60
	m ———	
	or 175	
	e	

(b) Spacing (shell-to-shell) between aboveground tanks.

(i) The distance between any two flammable or combustible liquid storage tanks shall not be less than 3 feet.

(ii) Except as provided in (2)(b)(iii) of this section, the distance between any two adjacent tanks shall not be less than one-sixth the sum of their diameters. When the diameter of one tank is less than one-half the diameter of the adjacent tank, the distance between the two tanks shall not be less than one-half the diameter of the smaller tank.

(iii) Where crude petroleum in conjunction with production facilities are located in noncongested areas and have capacities not exceeding 126,000 gallons (3,000 barrels), the distance between such tanks shall not be less than 3 feet.

(iv) Where unstable flammable or combustible liquids are stored, the distance between such tanks shall not be less than one-half the sum of their diameters.

(v) When tanks are compacted in three or more rows or in an irregular pattern, greater spacing or other means shall be provided so that inside tanks are accessible for fire fighting purposes.

(vi) The minimum separation between a liquefied petroleum gas container and a flammable or combustible liquid storage tank shall be 20 feet, except in the case of flammable or combustible liquid tanks operating at pressures exceeding 2.5 p.s.i.g. or equipped with emergency venting which will permit pressures to exceed 2.5 p.s.i.g. in which case the provisions of (2)(b)(i) and (ii) of this section shall apply. Suitable means shall be taken to prevent the accumulation of flammable or combustible liquids under adjacent liquefied petroleum gas containers such as by diversion curbs or grading. When flammable or combustible liquid storage tanks are within a diked area, the liquefied petroleum gas containers shall be outside the diked area and at least 10 feet away from the centerline of the wall of the diked area. The foregoing provisions shall not apply when liquefied petroleum gas containers of 125 gallons or less capacity are installed adjacent to fuel oil supply tanks of 550 gallons or less capacity.

(c) Location of outside aboveground tanks with respect to important buildings on same property. Every outside aboveground tank shall be separated from important buildings on the same property by distances not less than those specified in (2)(a)(i), (ii), (iii) and (iv) of this section, whichever is applicable. The appropriate distance column in Tables H-5, H-6, H-7, H-8, or H-9, that shall be used shall be the one reading: "Minimum distance in feet from nearest side of any public way or from nearest important building."

(d) Normal venting for aboveground tanks.

(i) Atmospheric storage tanks shall be adequately vented to prevent the development of vacuum or pressure sufficient to

distort the roof of a cone roof tank or exceed the design pressure in the case of other atmospheric tanks, as a result of filling or emptying, and atmospheric temperature changes.

(ii) Normal vents shall be sized either in accordance with: (A) The American Petroleum Institute Standard 2000 (1968), Venting Atmospheric and Low-Pressure Storage Tanks; or (B), other accepted standard; or (C) shall be at least as large as the filling or withdrawal connection, whichever is larger but in no case less than 1 1/4 inch nominal inside diameter.

(iii) Low-pressure tanks and pressure vessels shall be adequately vented to prevent development of pressure or vacuum, as a result of filling or emptying and atmospheric temperature changes, from exceeding the design pressure of the tank or vessel. Protection shall also be provided to prevent over-pressure from any pump discharging into the tank or vessel when the pump discharge pressure can exceed the design pressure of the tank or vessel.

(iv) If any tank or pressure vessel has more than one fill or withdrawal connection and simultaneous filling or withdrawal can be made, the vent size shall be based on the maximum anticipated simultaneous flow.

(v) Unless the vent is designed to limit the internal pressure 2.5 p.s.i. or less, the outlet of vents and vent drains shall be arranged to discharge in such a manner as to prevent localized overheating of any part of the tank in the event vapors from such vents are ignited.

(vi) Tanks and pressure vessels storing Class IA liquids shall be equipped with venting devices which shall be normally closed except when venting to pressures or vacuum conditions. Tanks and pressure vessels storing Class IB and IC liquids shall be equipped with venting devices which shall be normally closed except when venting under pressure or vacuum conditions, or with approved flame arresters.

Exemption: Tanks of 3,000 bbls. capacity or less containing crude petroleum in crude-producing areas; and, outside aboveground atmospheric tanks under 1,000 gallons capacity containing other than Class IA flammable liquids may have open vents.
(See (2)(f)(ii) of this section.)

(vii) Flame arresters or venting devices required in (2)(e)(vi) of this section may be omitted for Class IB and IC liquids where conditions are such that their use may, in case of obstruction, result in tank damage.

(e) Emergency relief venting for fire exposure for aboveground tanks.

(i) Every aboveground storage tank shall have some form of construction or device that will relieve excessive internal pressure caused by exposure fires.

(ii) In a vertical tank the construction referred to in (2)(e)(i) of this section may take the form of a floating roof, lifter roof, a weak roof-to-shell seam, or other approved pressure relieving construction. The weak roof-to-shell seam

shall be constructed to fail preferential to any other seam.

(iii) Where entire dependence for emergency relief is placed upon pressure relieving devices, the total venting capacity of both normal and emergency vents shall be enough to prevent rupture of the shell or bottom of the tank if vertical, or of the shell or heads if horizontal. If unstable liquids are stored, the effects of heat or gas resulting from polymerization, decomposition, condensation, or self-reactivity shall be taken into account. The total capacity of both normal and emergency venting devices shall be not less than that derived from Table H-10 except as provided in (2)(e)(v) and (vi) of this section. Such device may be a self-closing manhole cover, or one using long bolts that permit the cover to lift under internal pressure, or an additional or larger relief valve or valves. The wetted area of the tank shall be calculated on the basis of 55 percent of the total exposed area of a sphere or spheroid, 75 percent of the total exposed area of a horizontal tank and the first 30 feet above grade of the exposed shell area of a vertical tank.

TABLE 10
WETTED AREA VERSUS CUBIC FEET
FREE AIR PER HOUR
(14.7 psia and 60°F)

Square feet	CFH	Square feet	CFH	Square feet	CFH
20	21,100	200	211,000	1,000	524,000
30	31,600	250	239,000	1,200	557,000
40	42,100	300	265,000	1,400	587,000
50	52,700	350	288,000	1,600	614,000
60	63,200	400	312,000	1,800	639,000
70	73,700	500	354,000	2,000	662,000
80	84,200	600	392,000	2,400	704,000
90	94,800	700	428,000	2,800	742,000
100	105,000	800	462,000	and	
120	126,000	900	493,000	over	
140	147,000	1,000	524,000		
160	168,000				
180	190,000				
200	211,000				

(iv) For tanks and storage vessels designed for pressure over 1 p.s.i.g., the total rate of venting shall be determined in accordance with Table H-10, except that when the exposed

wetted area of the surface is greater than 2,800 square feet, the total rate of venting shall be calculated by the following formula:

$$CFH = 1,107A^{0.82}$$

Where:

CFH = Venting requirement, in cubic feet of free air per hour.

A = Exposed wetted surface, in square feet.

Note: The foregoing formula is based on $Q = 21,000A^{0.82}$.

(v) The total emergency relief venting capacity for any specific stable liquid may be determined by the following formula:

Cubic feet of
free air per
hour = V

V =

$$\frac{1337}{L M}$$

V = Cubic feet of free air per hour from Table H-10.

L = Latent heat of vaporization of specific liquid in B.t.u. per pound.

M = Molecular weight of specific liquids.

(vi) The required airflow rate of (2)(e)(iii) or (v) of this section may be multiplied by the appropriate factor listed in the following schedule when protection is provided as indicated. Only one factor may be used for any one tank.

0.5 for drainage in accordance with (2)(g)(ii) of this section for tanks over 200 square feet of wetted area.

0.3 for approved water spray.

0.3 for approved insulation.

0.15 for approved water spray with approved insulation.

(vii) The outlet of all vents and vent drains on tanks equipped with emergency venting to permit pressures exceeding 2.5 p.s.i.g. shall be arranged to discharge in such a way as to prevent localized overheating of any part of the tank, in the event vapors from such vents are ignited.

(viii) Each commercial tank venting device shall have stamped on it the opening pressure, the pressure at which the valve reaches the full open position, and the flow capacity at the latter pressure, expressed in cubic feet per hour of air at 60°F and at a pressure of 14.7 p.s.i.a.

(ix) The flow capacity of tank venting devices 12 inches and smaller in nominal pipe size shall be determined by actual test of each type and size of vent. These flow tests may be conducted by the manufacturer if certified by a qualified impartial observer, or may be conducted by an outside agency. The flow capacity of tank venting devices larger than 12 inches nominal pipe size, including manhole covers with long bolts or equivalent, may be calculated provided that the opening pressure is actually measured, the rating pressure and corresponding free orifice area are stated, the word "calculated" appears on the nameplate, and the computation is based on a flow coefficient of 0.5 applied to the rated orifice area.

(f) Vent piping for aboveground tanks.

(i) Vent piping shall be constructed in accordance with WAC 296-24-33007 of this section.

(ii) Where vent pipe outlets for tanks storing Class I liquids are adjacent to buildings or public ways, they shall be located so that the vapors are released at a safe point outside of buildings and not less than 12 feet above the adjacent ground level. In order to aid their dispersion, vapors shall be discharged upward or horizontally away from closely adjacent walls. Vent outlets shall be located so that flammable vapors will not be trapped by eaves or other obstructions and shall be at least five feet from building openings.

(iii) When tank vent piping is manifolded, pipe sizes shall be such as to discharge within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are subject to the same fire exposure.

(g) Drainage, dikes, and walls for aboveground tanks.

(i) Drainage and diked areas. The area surrounding a tank or a group of tanks shall be provided with drainage as in (2)(g)(ii) of this section, or shall be diked as provided in (2)(g)(iii), to prevent accidental discharge of liquid from endangering adjoining property or reaching waterways.

(ii) Drainage. Where protection of adjoining property or waterways is by means of a natural or manmade drainage system, such systems shall comply with the following:

(A) A slope of not less than 1 percent away from the tank toward the drainage system shall be provided.

(B) The drainage system shall terminate in vacant land or other area or in an impounding basin having a capacity not smaller than that of the largest tank served. This termination area and the route of the drainage system shall be so located that, if the flammable or combustible liquids in the drainage system are ignited, the fire will not seriously expose tanks or adjoining property.

(C) The drainage system, including automatic drainage pumps, shall not discharge to adjoining property, natural water courses, public sewers, or public drains unless the discharge of

flammable or combustible liquids would not constitute a hazard, or the system is so designed that it will not permit flammable or combustible liquids to be released.

(iii) Diked areas. Where protection of adjoining property or waterways is accomplished by retaining the liquid around the tank by means of a dike, the volume of the diked area shall comply with the following requirements:

(A) Except as provided in (2)(g)(iii)(B) of this section, the volumetric capacity of the diked area shall not be less than the greatest amount of liquid that can be released from the largest tank within the diked area, assuming a full tank. The capacity of the diked area enclosing more than one tank shall be calculated by deducting the volume of the tanks other than the largest tank below the height of the dike.

(B) For a tank or group of tanks with fixed roofs containing crude petroleum with boilover characteristics, the volumetric capacity of the diked area shall be not less than the capacity of the largest tank served by the enclosure, assuming a full tank. The capacity of the diked enclosure shall be calculated by deducting the volume below the height of the dike of all tanks within the enclosure.

(C) Walls of the diked area shall be of earth, steel, concrete or solid masonry designed to be liquidtight and to withstand a full hydrostatic head. Earthen walls 3 feet or more in height shall have a flat section at the top not less than 2 feet wide. The slope of an earthen wall shall be consistent with the angle of repose of the material of which the wall is constructed.

(D) The walls of the diked area shall be restricted to an average height of 6 feet above interior grade.

(E) Where provision is made for draining water from diked areas, drainage shall be provided at a uniform slope of not less than 1 percent away from tanks toward a sump, drainbox, or other safe means of disposal located at the greatest practical distance from the tank. Such drains shall normally be controlled in a manner so as to prevent flammable or combustible liquids from entering natural water courses, public sewers, or public drains, if their presence would constitute a hazard. Control of drainage shall be accessible under fire conditions.

(F) No loose combustible material, empty or full drum or barrel, shall be permitted within the diked area.

(G) Each diked area containing two or more tanks shall be subdivided preferably by drainage channels or at least by intermediate curbs in order to prevent spills from endangering adjacent tanks within the diked area as follows:

(I) When storing normally stable liquids in vertical cone roof tanks constructed with weak roof-to-shell seam or approved floating roof tanks or when storing crude petroleum in producing areas in any type of tank, one subdivision for each tank in

excess of 10,000 bbls. and one subdivision for each group of tanks (no tank exceeding 10,000 bbls. capacity) having an aggregate capacity not exceeding 15,000 bbls.

(II) When storing normally stable flammable or combustible liquids in tanks not covered in (g)(iii)(G)(I) of this subsection, one subdivision for each tank in excess of 100,000 gallons (2,500 bbls.) and one subdivision for each group of tanks (no tank exceeding 100,000 gallons capacity) having an aggregate capacity not exceeding 150,000 gallons (3,570 bbls.).

(III) When storing unstable liquids in any type of tank, one subdivision for each tank except that tanks installed in accordance with the drainage requirements of NFPA 15-1969, Standard for Water Spray Fixed Systems for Fire Protection shall require no additional subdivision.

(IV) The drainage channels or intermediate curbs shall be located between tanks so as to take full advantage of the available space with due regard for the individual tank capacities. Intermediate curbs, where used, shall be not less than 18 inches in height.

(h) Tank openings other than vents for aboveground tanks.

(i) Connections for all tank openings shall be vaportight and liquidtight. Vents are covered in (2)(d) through (f) of this section.

(ii) Each connection to an aboveground tank through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank. Such valves, when external, and their connections to the tank shall be of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary, they shall be suitable for the pressures, structural stresses, and temperatures involved, including fire exposures.

(iii) Each connection below the liquid level through which liquid does not normally flow shall be provided with a liquid-tight closure. This may be a valve, plug, or blind, or a combination of these.

(iv) Openings for gaging shall be provided with a vapor tight cap or cover.

(v) For Class IB and Class IC liquids other than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity. A fill pipe entering the top of a tank shall terminate within 6 inches of the bottom of the tank and shall be installed to avoid excessive vibration.

(vi) Filling and emptying connections which are made and broken shall be located outside of buildings at a location free from any source of ignition and not less than 5 feet away from any building opening. Such connection shall be closed and liquidtight when not in use. The connection shall be properly

identified.

(3) Installation of underground tanks.

(a) Location. Excavation for underground storage tanks shall be made with due care to avoid undermining of foundations of existing structures. Underground tanks or tanks under buildings shall be so located with respect to existing building foundations and supports that the loads carried by the latter cannot be transmitted to the tank. The distance from any part of a tank storing Class I liquids to the nearest wall of any basement or pit shall be not less than 1 foot, and to any property line that may be built upon, not less than 3 feet. The distance from any part of a tank storing Class II or Class III liquids to the nearest wall of any basement, pit or property line shall not be less than 1 foot.

(b) Depth and cover. Underground tanks shall be set on firm foundations and surrounded with at least 6 inches of noncorrosive, inert materials such as clean sand, earth, or gravel well tamped in place. The tank shall be placed in the hole with care since dropping or rolling the tank into the hole can break a weld, puncture or damage the tank, or scrape off the protective coating of coated tanks. Tanks shall be covered with a minimum of 2 feet of earth or shall be covered with not less than 1 foot of earth, on top of which shall be placed a slab of reinforced concrete not less than 4 inches thick. When underground tanks are, or are likely to be, subject to traffic, they shall be protected against damage from vehicles passing over them by at least 3 feet of earth cover, or 18 inches of well-tamped earth, plus 6 inches of reinforced concrete or 8 inches of asphaltic concrete. When asphaltic or reinforced concrete paving is used as part of the protection, it shall extend at least 1 foot horizontally beyond the outline of the tank in all directions.

(c) Corrosion protection. Corrosion protection for the tank and its piping shall be provided by one or more of the following methods:

- (i) Use of protective coatings or wrappings;
- (ii) Cathodic protection; or,
- (iii) Corrosion resistant materials of construction.

(d) Vents.

(i) Location and arrangement of vents for Class I liquids. Vent pipes from tanks storing Class I liquids shall be so located that the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 feet above the adjacent ground level. Vent pipes shall discharge only upward in order to disperse vapors. Vent pipes 2 inches or less in nominal inside diameter shall not be obstructed by devices that will cause excessive back pressure. Vent pipe outlets shall be so located that flammable vapors will not enter building openings, or be trapped under eaves or other obstructions. If

the vent pipe is less than 10 feet in length, or greater than 2 inches in nominal inside diameter, the outlet shall be provided with a vacuum and pressure relief device or there shall be an approved flame arrester located in the vent line at the outlet or within the approved distance from the outlet.

(ii) Size of vents. Each tank shall be vented through piping adequate in size to prevent blow-back of vapor or liquid at the fill opening while the tank is being filled. Vent pipes shall be not less than 1 1/4 inch nominal inside diameter.

TABLE H-11
VENT LINE DIAMETERS

Maximum flow GPM		Pipe length*		
		50 feet	100 feet	200 feet
100	_____	Inches 1 1/4	Inches 1 1/4	Inches 1 1/4
200	_____	1 1/4	1 1/4	1 1/4
300	_____	1 1/4	1 1/4	1 1/2
400	_____	1 1/4	1 1/2	2
500	_____	1 1/2	1 1/2	2
600	_____	1 1/2	2	2
700	_____	2	2	2
800	_____	2	2	3
900	_____	2	2	3
1,000	_____	2	2	3

* Vent lines of 50 ft., 100 ft., and 200 ft. of pipe plus 7 ells.

(iii) Location and arrangement of vents for Class II or Class III liquids. Vent pipes from tanks storing Class II or Class III flammable liquids shall terminate outside of the building and higher than the fill pipe opening. Vent outlets shall be above normal snow level. They may be fitted with return bends, coarse screens or other devices to minimize ingress of foreign material.

(iv) Vent piping shall be constructed in accordance with WAC 296-24-33007. Vent pipes shall be so laid as to drain toward the tank without sags or traps in which liquid can collect. They shall be located so that they will not be subjected to physical damage. The tank end of the vent pipe

shall enter the tank through the top.

(v) When tank vent piping is manifolded, pipe sizes shall be such as to discharge, within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are filled simultaneously.

(e) Tank openings other than vents.

(i) Connections for all tank openings shall be vapor or liquid tight.

(ii) Openings for manual gaging, if independent of the fill pipe, shall be provided with a liquid-tight cap or cover. If inside a building, each such opening shall be protected against liquid overflow and possible vapor release by means of a spring-loaded check valve or other approved device.

(iii) Fill and discharge lines shall enter tanks only through the top. Fill lines shall be sloped toward the tank.

(iv) For Class IB and Class IC liquids other than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank.

(v) Filling and emptying connections which are made and broken shall be located outside of buildings at a location free from any source of ignition and not less than 5 feet away from any building opening. Such connection shall be closed and liquidtight when not in use. The connection shall be properly identified.

(4) Installation of tanks inside of buildings.

(a) Location. Tanks shall not be permitted inside of buildings except as provided in WAC 296-24-33011 and 296-24-33015 through 296-24-33019.

(b) Vents. Vents for tanks inside of buildings shall be as provided in (2)(d),(e),(f)(ii) and (3)(d) of this section, except that emergency venting by the use of weak roof seams on tanks shall not be permitted. Vents shall discharge vapors outside the buildings.

(c) Vent piping. Vent piping shall be constructed in accordance with WAC 296-24-33007.

(d) Tank openings other than vents.

(i) Connections for all tank openings shall be vapor or liquidtight. Vents are covered in (4)(b) of this section.

(ii) Each connection to a tank inside of buildings through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank. Such valves, when external, and their connections to the tank shall be of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary, they shall be suitable for the pressures, structural stresses, and temperatures involved, including fire exposures.

(iii) Flammable or combustible liquid tanks located inside of buildings, except in one-story buildings designed and protected for flammable or combustible liquid storage, shall be provided with an automatic-closing heat-actuated valve on each withdrawal connection below the liquid level, except for connections used for emergency disposal, to prevent continued flow in the event of fire in the vicinity of the tank. This function may be incorporated in the valve required in (4)(d)(ii) of this section, and if a separate valve, shall be located adjacent to the valve required in (4)(d)(ii) of this section.

(iv) Openings for manual gaging, if independent of the fill pipe (see (4)(d)(vi) of this section), shall be provided with a vaportight cap or cover. Each such opening shall be protected against liquid overflow and possible vapor release by means of a spring loaded check valve or other approved device.

(v) For Class IB and Class IC liquids other than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank.

(vi) The fill pipe inside of the tank shall be installed to avoid excessive vibration of the pipe.

(vii) The inlet of the fill pipe shall be located outside of buildings at a location free from any source of ignition and not less than 5 feet away from any building opening. The inlet of the fill pipe shall be closed and liquidtight when not in use. The fill connection shall be properly identified.

(viii) Tanks inside buildings shall be equipped with a device, or other means shall be provided, to prevent overflow into the building.

(5) Supports, foundations, and anchorage for all tank locations.

(a) General. Tank supports shall be installed on firm foundations. Tank supports shall be of concrete, masonry, or protected steel. Single wood timber supports (not cribbing) laid horizontally may be used for outside aboveground tanks if not more than 12 inches high at their lowest point.

(b) Fire resistance. Steel supports or exposed piling shall be protected by materials having a fire resistance rating of not less than 2 hours, except that steel saddles need not be protected if less than 12 inches high at their lowest point. Water spray protection or its equivalent may be used in lieu of fire-resistive materials to protect supports.

(c) Spheres. The design of the supporting structure for tanks such as spheres shall receive special engineering consideration.

(d) Load distribution. Every tank shall be so supported as to prevent the excessive concentration of loads on the supporting portion of the shell.

(e) Foundations. Tanks shall rest on the ground or on foundations made of concrete, masonry, piling, or steel. Tank foundations shall be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation.

(f) Flood areas. Where a tank is located in an area that may be subjected to flooding, the applicable precautions outlined in (5)(f) of this section shall be observed.

(i) No aboveground vertical storage tank containing a flammable or combustible liquid shall be located so that the allowable liquid level within the tank is below the established maximum flood stage, unless the tank is provided with a guiding structure such as described in (5)(f)(xiii), (xiv) and (xv) of this section.

(ii) Independent water supply facilities shall be provided at locations where there is no ample and dependable public water supply available for loading partially empty tanks with water.

(iii) In addition to the preceding requirements, each tank so located that more than 70 percent, but less than 100 percent, of its allowable liquid storage capacity will be submerged at the established maximum flood stage, shall be safeguarded by one of the following methods: Tank shall be raised, or its height shall be increased, until its top extends above the maximum flood stage a distance equivalent to 30 percent or more of its allowable liquid storage capacity: Provided, however, That the submerged part of the tank shall not exceed two and one-half times the diameter. Or, as an alternative to the foregoing, adequate noncombustible structural guides, designed to permit the tank to float vertically without loss of product, shall be provided.

(iv) Each horizontal tank so located that more than 70 percent of its storage capacity will be submerged at the established flood stage, shall be anchored, attached to a foundation of concrete or of steel and concrete, of sufficient weight to provide adequate load for the tank when filled with flammable or combustible liquid and submerged by flood waters to the established flood stage, or adequately secured by other means.

(v) Spherical and spheroidal tanks shall be protected by applicable methods as specified for either vertical or horizontal tanks.

(vi) At locations where there is no ample and dependable water supply, or where filling of underground tanks with liquid is impracticable because of the character of their contents, their use, or for other reasons, each tank shall be safeguarded against movement when empty and submerged by high ground water or flood waters by anchoring, weighting with concrete or other approved solid loading material, or securing by other means. Each such tank shall be so constructed and installed that it

will safely resist external pressures due to high ground water or flood waters.

(vii) At locations where there is an ample and dependable water supply available, underground tanks containing flammable or combustible liquids, so installed that more than 70 percent of their storage capacity will be submerged at the maximum flood stage, shall be so anchored, weighted, or secured by other means, as to prevent movement of such tanks when filled with flammable or combustible liquids, and submerged by flood waters to the established flood stage.

(viii) Pipe connections below the allowable liquid level in a tank shall be provided with valves or cocks located as closely as practicable to the tank shell. Such valves and their connections to tanks shall be of steel or other material suitable for use with the liquid being stored. Cast iron shall not be used.

(ix) At locations where an independent water supply is required, it shall be entirely independent of public power and water supply. Independent source of water shall be available when flood waters reach a level not less than 10 feet below the bottom of the lowest tank on a property.

(x) The self-contained power and pumping unit shall be so located or so designed that pumping into tanks may be carried on continuously throughout the rise in flood waters from a level 10 feet below the lowest tank to the level of the potential flood stage.

(xi) Capacity of the pumping unit shall be such that the rate of rise of water in all tanks shall be equivalent to the established potential average rate of rise of flood waters at any stage.

(xii) Each independent pumping unit shall be tested periodically to insure that it is in satisfactory operating condition.

(xiii) Structural guides for holding floating tanks above their foundations shall be so designed that there will be no resistance to the free rise of a tank, and shall be constructed of noncombustible material.

(xiv) The strength of the structure shall be adequate to resist lateral movement of a tank subject to a horizontal force in any direction equivalent to not less than 25 pounds per square foot acting on the projected vertical cross-sectional area of the tank.

(xv) Where tanks are situated on exposed points or bends in a shoreline where swift currents in flood waters will be present, the structures shall be designed to withstand a unit force of not less than 50 pounds per square foot.

(xvi) The filling of a tank to be protected by water loading shall be started as soon as flood waters reach a dangerous flood stage. The rate of filling shall be at least

equal to the rate of rise of the floodwaters (or the established average potential rate of rise).

(xvii) Sufficient fuel to operate the water pumps shall be available at all times to insure adequate power to fill all tankage with water.

(xviii) All valves on connecting pipelines shall be closed and locked in closed position when water loading has been completed.

(xix) Where structural guides are provided for the protection of floating tanks, all rigid connections between tanks and pipelines shall be disconnected and blanked off or binded before the floodwaters reach the bottom of the tank, unless control valves and their connections to the tank are of a type designed to prevent breakage between the valve and the tank shell.

(xx) All valves attached to tanks other than those used in connection with water loading operations shall be closed and locked.

(xxi) If a tank is equipped with a swing line, the swing pipe shall be raised to and secured at its highest position.

(xxii) Inspections. The director or his/her designated representative shall make periodic inspections of all plants where the storage of flammable or combustible liquids is such as to require compliance with the foregoing requirements, in order to assure the following:

(A) That all flammable or combustible liquid storage tanks are in compliance with these requirements and so maintained.

(B) That detailed printed instructions of what to do in flood emergencies are properly posted.

(C) That station operators and other employees depended upon to carry out such instructions are thoroughly informed as to the location and operation of such valves and other equipment necessary to effect these requirements.

(g) Earthquake areas. In areas subject to earthquakes, the tank supports and connections shall be designed to resist damage as a result of such shocks.

(6) Sources of ignition. In locations where flammable vapors may be present, precautions shall be taken to prevent ignition by eliminating or controlling sources of ignition. Sources of ignition may include open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, and mechanical), spontaneous ignition, chemical and physical-chemical reactions, and radiant heat.

(7) Testing.

(a) General. All tanks, whether shop built or field erected, shall be strength tested before they are placed in service in accordance with the applicable sections of the code under which they were built. The American Society of Mechanical Engineers (ASME) code stamp. American Petroleum Institute (API)

monogram, or the label of the Underwriters' Laboratories, Inc., on a tank shall be evidence of compliance with this strength test. Tanks not marked in accordance with the above codes shall be strength tested before they are placed in service in accordance with good engineering principles and reference shall be made to the sections on testing in the codes listed in (1)(c)(i), (d)(ii) or (e)(ii) of this section.

(b) Strength. When the vertical length of the fill and vent pipes is such that when filled with liquid the static head imposed upon the bottom of the tank exceeds 10 pounds per square inch, the tank and related piping shall be tested hydrostatically to a pressure equal to the static head thus imposed.

(c) Tightness. In addition to the strength test called for in (7)(a) and (b), all tanks and connections shall be tested for tightness. Except for underground tanks, this tightness test shall be made at operating pressure with air, inert gas, or water prior to placing the tank in service. In the case of field-erected tanks the strength test may be considered to be the test for tank tightness. Underground tanks and piping, before being covered, enclosed, or placed in use, shall be tested for tightness hydrostatically, or with air pressure at not less than 3 pounds per square inch and not more than 5 pounds per square inch.

(d) Repairs. All leaks or deformations shall be corrected in an acceptable manner before the tank is placed in service. Mechanical caulking is not permitted for correcting leaks in welded tanks except pinhole leaks in the roof.

(e) Derated operations. Tanks to be operated at pressures below their design pressure may be tested by the applicable provisions of (7)(a) or (b) based upon the pressure developed under full emergency venting of the tank.

AMENDATORY SECTION (Amending WSR 00-06-075, filed 3/1/00, effective 4/10/00)

WAC 296-62-07709 Exposure assessment and monitoring. (1)
General monitoring criteria.

(a) Each employer who has a workplace or work operation where exposure monitoring is required under this part must perform monitoring to determine accurately the airborne concentrations of asbestos to which employees may be exposed.

(b) Determinations of employee exposure must be made from breathing zone air samples that are representative of the eight-hour TWA and thirty minute short-term exposures of each employee.

(c) Representative eight-hour TWA employee exposures must be determined on the basis of one or more samples representing full-shift exposure for each shift for each employee in each job classification in each work area.

(d) Representative thirty minute short-term employee exposures must be determined on the basis of one or more samples representing thirty minute exposures associated with operations that are most likely to produce exposures above the excursion limit for each shift for each job classification in each work area.

(2) Exposure monitoring requirements for all occupational exposures to asbestos in all industries covered by the Washington Industrial Safety and Health Act except construction work, as defined in WAC 296-155-012, and except ship repairing, shipbuilding and shipbreaking employments and related employments as defined in WAC 296-304-01001.

(a) Initial monitoring.

(i) Each employer who has a workplace or work operation covered by this standard, except as provided for in (a)(ii) and (iii) of this subsection, must perform initial monitoring of employees who are, or may reasonably be expected to be exposed to airborne concentrations at or above the TWA permissible exposure limit and/or excursion limit. The initial monitoring must be at the initiation of each asbestos job to accurately determine the airborne concentration of asbestos to which employees may be exposed.

(ii) Where the employer or his/her representative has monitored after March 31, 1992, for the TWA permissible exposure limit and/or excursion limit, and the monitoring satisfies all other requirements of this section, and the monitoring data was obtained during work operations conducted under workplace

conditions closely resembling the processes, type of material including percentage of asbestos, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results to satisfy the requirements of (a)(i) of this subsection.

(iii) Where the employer has relied upon objective data that demonstrates that asbestos is not capable of being released in airborne concentrations at or above the TWA permissible exposure limit and/or excursion limit under those work conditions of processing, use, or handling expected to have the greatest potential for releasing asbestos, then no initial monitoring is required.

(b) Monitoring frequency (periodic monitoring) and patterns. After the initial determinations required by subsection (2)(a)(i) of this section, samples must be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. Sampling must not be at intervals greater than six months for employees whose exposures may reasonably be foreseen to exceed the TWA permissible exposure limit and/or excursion limit.

(c) Daily monitoring within regulated areas: The employer must conduct daily monitoring that is representative of the exposure of each employee who is assigned to work within a regulated area. Exception: When all employees within a regulated area are equipped with full facepiece supplied-air respirators operated in the pressure-demand mode equipped with either an auxiliary positive pressure self-contained breathing apparatus or a HEPA filter, the employer may dispense with the daily monitoring required by this subsection.

(d) Changes in monitoring frequency. If either the initial or the periodic monitoring required by subsection (2)(a) and (b) of this section statistically indicates that employee exposures are below the TWA permissible exposure limit and/or excursion limit, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.

(e) Additional monitoring. Notwithstanding the provisions of subsection (2)(a)(ii) and (c) of this section, the employer must institute the exposure monitoring required under subsection (2)(a)(i) and (ii) of this section whenever there has been a change in the production, process, control equipment, personnel, or work practices that may result in new or additional exposures above the TWA permissible exposure limit and/or excursion limit, or when the employer has any reason to suspect that a change may result in new or additional exposures above the TWA permissible exposure limit and/or excursion limit.

(3) Exposure assessment monitoring requirements for all construction work as defined in WAC 296-155-012 and for all ship repairing, shipbuilding and shipbreaking employments and related

employments as defined in WAC 296-304-01001.

(a) Initial exposure assessment.

(i) Each employer who has a workplace or work operation covered by this standard must ensure that a "competent person" conducts an exposure assessment immediately before or at the initiation of the operation to ascertain expected exposures during that operation or workplace. The assessment must be completed in time to comply with the requirements which are triggered by exposure data or lack of a "negative exposure assessment," and to provide information necessary to assure that all control systems planned are appropriate for that operation and will work properly.

(ii) Basis of initial exposure assessment: Unless a negative exposure assessment has been made according to (b) of this subsection, the initial exposure assessment must, if feasible, be based on monitoring conducted according to (b) of this subsection. The assessment must take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the employer which indicate the levels of airborne asbestos likely to be encountered on the job. For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of the PELs, or otherwise makes a negative exposure assessment according to (b) of this subsection, the employer must presume that employees are exposed in excess of the TWA and excursion limit.

(b) Negative exposure assessment: For any one specific asbestos job which will be performed by employees who have been trained in compliance with the standard, the employer may demonstrate that employee exposures will be below the PELs by data which conform to the following criteria:

(i) Objective data demonstrating that the products or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the TWA and excursion limit under those work conditions having the greatest potential for releasing asbestos; or

(ii) Where the employer has monitored prior asbestos jobs for the PEL and the excursion limit within 12 months of the current or projected job, the monitoring and analysis were performed in compliance with the asbestos standard in effect; and the data was obtained during work operations conducted under workplace conditions "closely resembling" the processes, type of material including percentage of asbestos, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the operations were conducted by employees whose training and experience are no more extensive

than that of employees performing the current job, and these data show that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that employee exposures will not exceed the TWA or excursion limit; or

(iii) The results of initial exposure monitoring of the current job made from breathing zone samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee covering operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

(c) Periodic monitoring.

(i) Class I and Class II operations. The employer must conduct daily monitoring that is representative of the exposure of each employee who is assigned to work within a regulated area who is performing Class I or II work, unless the employer according to (b) of this subsection, has made a negative exposure assessment for the entire operation.

(ii) All operations under the standard other than Class I and II operations. The employer must conduct periodic monitoring of all work where exposures are expected to exceed a PEL, at intervals sufficient to document the validity of the exposure prediction.

(iii) Exception. When all employees required to be monitored daily are equipped with supplied-air respirators operated in the pressure demand mode, the employer may dispense with the daily monitoring required by subsection (2)(c) of this section. However, employees performing Class I work using a control method which is not listed in WAC 296-62-07712 or using a modification of a listed control method, must continue to be monitored daily even if they are equipped with supplied-air respirators.

(d) Termination of monitoring. If the periodic monitoring required by (c) of this subsection reveals that employee exposures, as indicated by statistically reliable measurements, are below the permissible exposure limit and excursion limit the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(e) Monitoring outside negative-pressure enclosures: The employer must conduct representative area monitoring of the airborne fiber levels at least every other day at the HEPA machine exhaust and entrance to the decontamination area.

(f) Additional monitoring. Notwithstanding the provisions of (b), (c), and (d) of this subsection, the employer must institute the exposure monitoring required under (c) of this subsection whenever there has been a change in process, control equipment, personnel or work practices that may result in new or additional exposures above the permissible exposure limit and/or excursion limit or when the employer has any reason to suspect

that a change may result in new or additional exposures above the permissible exposure limit and/or excursion limit. Such additional monitoring is required regardless of whether a "negative exposure assessment" was previously produced for a specific job.

(g) Preabatement monitoring. Prior to the start of asbestos work, representative area air monitoring must be conducted for comparison to clearance monitoring as required by subsection (3)(h) of this section. Preabatement air monitoring is not required for outdoor work.

(h) Clearance monitoring. Representative area air monitoring must be taken at the completion of the asbestos work. Air sample results must be obtained before removal or reoccupancy of the regulated area. Clearance air monitoring is not required for outdoor asbestos work. The employer must demonstrate by monitoring that the airborne concentration is below:

- ✎ The permissible exposure limit; or
- ✎ At or below the airborne fiber level existing prior to the start of the asbestos work, whichever level is lower.

(4) Method of monitoring.

(a) All samples taken to satisfy the employee exposure monitoring requirements of this section must be personal samples collected following the procedures specified in WAC 296-62-07735, Appendix A.

(b) Monitoring must be performed by persons having a thorough understanding of monitoring principles and procedures and who can demonstrate proficiency in sampling techniques.

(c) All samples taken to satisfy the monitoring requirements of this section must be evaluated using the WISHA reference method specified in WAC 296-62-07735, Appendix A, or an equivalent counting method recognized by the department.

(d) If an equivalent method to the WISHA reference method is used, the employer must ensure that the method meets the following criteria:

(i) Replicate exposure data used to establish equivalency are collected in side-by-side field and laboratory comparisons; and

(ii) The comparison indicates that ninety percent of the samples collected in the range 0.5 to 2.0 times the permissible limit have an accuracy range of plus or minus twenty-five percent of the WISHA reference method results at a ninety-five percent confidence level as demonstrated by a statistically valid protocol; and

(iii) The equivalent method is documented and the results of the comparison testing are maintained.

(e) To satisfy the monitoring requirements of this section, employers must use the results of monitoring analysis performed by laboratories which have instituted quality assurance programs

that include the elements as prescribed in WAC 296-62-07735, Appendix A.

(5) Employee notification of monitoring results.

(a) The employer must, as soon as possible but no later than within five days for construction and shipyard industries and fifteen working days for other industries, after the receipt of the results of any monitoring performed under the standard, notify the affected employees of these results in writing either individually or by posting of results in an appropriate location that is accessible to affected employees.

(b) The written notification required by (a) of this subsection must contain the corrective action being taken by the employer to reduce employee exposure to or below the TWA and/or excursion exposure limits, wherever monitoring results indicated that the TWA and/or excursion exposure limits had been exceeded.

(6) Observation of monitoring.

(a) The employer must provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos conducted in accordance with this section.

(b) When observation of the monitoring of employee exposure to asbestos requires entry into an area where the use of protective clothing or equipment is required, the observer must be provided with and be required to use such clothing and equipment and shall comply with all other applicable safety and health procedures.

AMENDATORY SECTION (Amending WSR 99-17-026, filed 8/10/99, effective 11/10/99)

WAC 296-62-07712 Requirements for asbestos activities in construction and shipyard work. (1) Methods of compliance, the following engineering controls and work practices of this section must be used for construction work defined in WAC 296-155-012 and for all ship repair defined in WAC 296-304-010.

(2) Engineering controls and work practices for all operations covered by this section. The employer must use the following engineering controls and work practices in all operations covered by this section, regardless of the levels of exposure:

(a) Vacuum cleaners equipped with HEPA filters to collect all debris and dust containing ACM and PACM, except as provided in subsection (10)(b) of this section in the case of roofing material.

(b) Wet methods, or wetting agents, to control employee

exposures during asbestos handling, mixing, removal, cutting, application, and cleanup, except where employers demonstrate that the use of wet methods is infeasible due to, for example, the creation of electrical hazards, equipment malfunction, and, in roofing, except as provided in subsection (10)(b) of this section.

(c) Asbestos must be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet saturated state to prevent the emission of airborne fibers unless the usefulness of the product would be diminished thereby.

(d) Prompt cleanup and disposal of wastes and debris contaminated with asbestos in leak-tight containers except in roofing operations, where the procedures specified in this section apply.

(3) In addition to the requirements of subsection (2) of this section, the employer must use the following control methods to achieve compliance with the TWA permissible exposure limit and excursion limit prescribed by WAC 296-62-07705:

(a) Local exhaust ventilation equipped with HEPA filter dust collection systems;

(b) Enclosure or isolation of processes producing asbestos dust;

(c) Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;

(d) Use of other work practices and engineering controls that the department can show to be feasible;

(e) Wherever the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the permissible exposure limit and/or excursion limit prescribed in WAC 296-62-07705, the employer must use them to reduce employee exposure to the lowest levels attainable by these controls and must supplement them by the use of respiratory protection that complies with the requirements of WAC 296-62-07715.

(4) Prohibitions. The following work practices and engineering controls must not be used for work related to asbestos or for work which disturbs ACM or PACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

(a) High-speed abrasive disc saws that are not equipped with point or cut ventilator or enclosures with HEPA filtered exhaust air;

(b) Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air;

(c) Dry sweeping, shoveling or other dry cleanup of dust and debris containing ACM and PACM;

(d) Employee rotation as a means of reducing employee exposure to asbestos.

(5) Cleanup.

(a) After completion of asbestos work (removal, demolition, and renovation operations), all surfaces in and around the work area must be cleared of any asbestos debris.

(b) Encapsulant must be applied to all areas where asbestos has been removed to ensure binding of any remaining fibers.

(6) Class I requirements. The following engineering controls and work practices and procedures must be used:

(a) All Class I work, including the installation and operation of the control system must be supervised by a competent person as defined in WAC 296-62-07703;

(b) For all Class I jobs involving the removal of more than 25 linear or 10 square feet of thermal system insulation or surfacing material; for all other Class I jobs, where the employer cannot produce a negative exposure assessment according to WAC 296-62-07709(3), or where employees are working in areas adjacent to the regulated area, while the Class I work is being performed, the employer must use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area:

(i) Critical barriers must be placed over all the openings to the regulated area, except where activities are performed outdoors; or

(ii) The employer must use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area surveillance during each work shift at each boundary of the regulated area, showing no visible asbestos dust; and perimeter area monitoring showing that clearance levels contained in 40 CFR Part 763, Subpart E, of the EPA Asbestos in Schools Rule are met, or that perimeter area levels, measured by Phase Contrast Microscopy (PCM) are no more than background levels representing the same area before the asbestos work began. The results of such monitoring must be made known to the employer no later than 24 hours from the end of the work shift represented by such monitoring. Exception: For work completed outdoors where employees are not working in areas adjacent to the regulated areas, (a) of this subsection is satisfied when the specific control methods in subsection (7) of this section are used;

(c) For all Class I jobs, HVAC systems must be isolated in the regulated area by sealing with a double layer of 6 mil plastic or the equivalent;

(d) For all Class I jobs, impermeable dropcloths shall be placed on surfaces beneath all removal activity;

(e) For all Class I jobs, all objects within the regulated area must be covered with impermeable dropcloths or plastic sheeting which is secured by duct tape or an equivalent;

(f) For all Class I jobs where the employer cannot produce a negative exposure assessment, or where exposure monitoring shows that a PEL is exceeded, the employer must ventilate the regulated area to move contaminated air away from the breathing zone of employees toward a HEPA filtration or collection device.

(7) Specific control methods for Class I work. In addition, Class I asbestos work must be performed using one or more of the following control methods according to the limitations stated below:

(a) Negative pressure enclosure (NPE) systems: NPE systems may be used where the configuration of the work area does not make the erection of the enclosure infeasible, with the following specifications and work practices:

(i) Specifications:

(A) The negative pressure enclosure (NPE) may be of any configuration;

(B) At least 4 air changes per hour must be maintained in the NPE;

(C) A minimum of -0.02 column inches of water pressure differential, relative to outside pressure, must be maintained within the NPE as evidenced by manometric measurements;

(D) The NPE must be kept under negative pressure throughout the period of its use; and

(E) Air movement must be directed away from employees performing asbestos work within the enclosure, and toward a HEPA filtration or collection device.

(ii) Work practices:

(A) Before beginning work within the enclosure and at the beginning of each shift, the NPE must be inspected for breaches and smoke-tested for leaks, and any leaks sealed.

(B) Electrical circuits in the enclosure must be deactivated, unless equipped with ground-fault circuit interrupters.

(b) Glove bag systems may be used to remove PACM and/or ACM from straight runs of piping and elbows and other connections with the following specifications and work practices:

(i) Specifications:

(A) Glove bags must be made of 6 mil thick plastic and must be seamless at the bottom.

(B) Glove bags used on elbows and other connections must be designed for that purpose and used without modifications.

(ii) Work practices:

(A) Each glove bag must be installed so that it completely covers the circumference of pipe or other structure where the work is to be done.

(B) Glove bags must be smoke-tested for leaks and any leaks sealed prior to use.

(C) Glove bags may be used only once and may not be moved.

(D) Glove bags must not be used on surfaces whose

temperature exceeds 150°F.

(E) Prior to disposal, glove bags must be collapsed by removing air within them using a HEPA vacuum.

(F) Before beginning the operation, loose and friable material adjacent to the glove bag/box operation must be wrapped and sealed in two layers of six mil plastic or otherwise rendered intact.

(G) Where system uses attached waste bag, such bag must be connected to collection bag using hose or other material which must withstand pressure of ACM waste and water without losing its integrity.

(H) Sliding valve or other device must separate waste bag from hose to ensure no exposure when waste bag is disconnected.

(I) At least two persons must perform Class I glove bag removal operations.

(c) Negative pressure glove bag systems. Negative pressure glove bag systems may be used to remove ACM or PACM from piping.

(i) Specifications: In addition to specifications for glove bag systems above, negative pressure glove bag systems must attach HEPA vacuum systems or other devices to bag during removal.

(ii) Work practices:

(A) The employer must comply with the work practices for glove bag systems in this section.

(B) The HEPA vacuum cleaner or other device used during removal must run continually during the operation until it is completed at which time the bag must be collapsed prior to removal of the bag from the pipe.

(C) Where a separate waste bag is used along with a collection bag and discarded after one use, the collection bag may be reused if rinsed clean with amended water before reuse.

(d) Negative pressure glove box systems: Negative pressure glove boxes may be used to remove ACM or PACM from pipe runs with the following specifications and work practices:

(i) Specifications:

(A) Glove boxes must be constructed with rigid sides and made from metal or other material which can withstand the weight of the ACM and PACM and water used during removal.

(B) A negative pressure generator must be used to create negative pressure in the system.

(C) An air filtration unit must be attached to the box.

(D) The box must be fitted with gloved apertures.

(E) An aperture at the base of the box must serve as a bagging outlet for waste ACM and water.

(F) A back-up generator must be present on site.

(G) Waste bags must consist of 6 mil thick plastic double-bagged before they are filled or plastic thicker than 6 mil.

(ii) Work practices:

(A) At least two persons must perform the removal.

(B) The box must be smoke-tested for leaks and any leaks sealed prior to each use.

(C) Loose or damaged ACM adjacent to the box must be wrapped and sealed in two layers of 6 mil plastic prior to the job, or otherwise made intact prior to the job.

(D) A HEPA filtration system must be used to maintain pressure barrier in box.

(e) Water spray process system. A water spray process system may be used for removal of ACM and PACM from cold line piping if, employees carrying out such process have completed a 40-hour separate training course in its use, in addition to training required for employees performing Class I work. The system must meet the following specifications and shall be performed by employees using the following work practices:

(i) Specifications:

(A) Piping must be surrounded on 3 sides by rigid framing.

(B) A 360 degree water spray, delivered through nozzles supplied by a high pressure separate water line, must be formed around the piping.

(C) The spray must collide to form a fine aerosol which provides a liquid barrier between workers and the ACM and PACM.

(ii) Work practices:

(A) The system must be run for at least 10 minutes before removal begins.

(B) All removal must take place within the water barrier.

(C) The system must be operated by at least three persons, one of whom must not perform removal, but must check equipment, and ensure proper operation of the system.

(D) After removal, the ACM and PACM must be bagged while still inside the water barrier.

(f) A small walk-in enclosure which accommodates no more than two persons (mini-enclosure) may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices:

(i) Specifications:

(A) The fabricated or job-made enclosure must be constructed of 6 mil plastic or equivalent.

(B) The enclosure must be placed under negative pressure by means of a HEPA filtered vacuum or similar ventilation unit.

(C) Change room. A small change room made of 6-mil-thick polyethylene plastic should be contiguous to the mini-enclosure, and is necessary to allow the worker to vacuum off his/her protective coveralls and remove them before leaving the work area. While inside the enclosure, the worker should wear Tyvek disposable coveralls or equivalent and must use the appropriate HEPA-filtered dual cartridge respiratory protection. The advantages of mini-enclosures are that they limit the spread of asbestos contamination, reduce the potential exposure of bystanders and other workers who may be working in adjacent

areas, and are quick and easy to install. The disadvantage of mini-enclosures is that they may be too small to contain the equipment necessary to create a negative-pressure within the enclosure; however, the double layer of plastic sheeting will serve to restrict the release of asbestos fibers to the area outside the enclosure.

(ii) Work practices:

(A) Before use, the mini-enclosure must be inspected for leaks and smoke-tested to detect breaches, and any breaches sealed.

(B) Before reuse, the interior must be completely washed with amended water and HEPA-vacuumed.

(C) During use, air movement must be directed away from the employee's breathing zone within the mini-enclosure.

(8) Alternative control methods for Class I work. Class I work may be performed using a control method which is not referenced in subsection (2)(a) through (3)(e) of this section, or which modifies a control method referenced in subsection (2)(a) through (3)(e) of this section, if the following provisions are complied with:

(a) The control method shall enclose, contain or isolate the processes or source of airborne asbestos dust, before it enters the breathing zone of employees.

(b) A certified industrial hygienist or licensed professional engineer who is also qualified as a project designer as defined in WAC 296-62-07703, shall evaluate the work area, the projected work practices and the engineering controls and shall certify in writing that the planned control method is adequate to reduce direct and indirect employee exposure to below the PELs under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA's Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria in subsection (6)(b)(ii) of this section. Where the TSI or surfacing material to be removed is 25 linear or 10 square feet or less, the evaluation required in subsection (8)(b) of this section may be performed by a competent person.

(c) Before work which involves the removal of more than 25 linear or 10 square feet of thermal system insulation or surfacing material is begun using an alternative method which has been the subject of subsection (2)(a) through (3)(e) of this section required evaluation and certification, the employer shall ~~((send))~~ include a copy of such evaluation and certification ~~((to the Department of Labor and Industries, Asbestos Certification Program, P.O. Box 44614, Olympia, Washington 98504-4614))~~ with notifications required by WAC 296-65-020, Notification requirements. The submission shall not constitute approval by WISHA.

(d) The evaluation of employee exposure required in WAC 296-62-07712(8) must include and be based on sampling and analytical data representing employee exposure during the use of such method under the worst-case conditions and by employees whose training and experiences are equivalent to employees who are to perform the current job.

(9) Work practices and engineering controls for Class II work.

(a) All Class II work must be supervised by a competent person as defined in WAC 296-62-07703.

(b) For all indoor Class II jobs, where the employer has not produced a negative exposure assessment according to WAC 296-62-07709(3), or where during the job, changed conditions indicate there may be exposure above the PEL or where the employer does not remove the ACM in a substantially intact state, the employer must use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area:

(i) Critical barriers must be placed over all openings to the regulated area; or

(ii) The employer must use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area monitoring or clearance monitoring which meets the criteria set out in subsection (6)(b)(ii) of this section.

(c) Impermeable dropcloths must be placed on surfaces beneath all removal activity.

(d) All Class II asbestos work must be performed using the work practices and requirements set out above in subsection (2) of this section.

(10) Additional controls for Class II work. Class II asbestos work must also be performed by complying with the work practices and controls designated for each type of asbestos work to be performed, set out in this paragraph. Where more than one control method may be used for a type of asbestos work, the employer may choose one or a combination of designated control methods. Class II work also may be performed using a method allowed for Class I work, except that glove bags and glove boxes are allowed if they fully enclose the Class II material to be removed.

(a) For removing vinyl and asphalt flooring materials which contain ACM or for which in buildings constructed no later than 1980, the employer has not verified the absence of ACM according to WAC 296-62-07712 (10)(a)(ix). The employer must ensure that employees comply with the following work practices and that employees are trained in these practices according to WAC 296-62-07722.

(i) Flooring or its backing must not be sanded.

(ii) Vacuums equipped with HEPA filter, disposable dust

bag, and metal floor tool (no brush) must be used to clean floors.

(iii) Resilient sheeting must be removed by cutting with wetting of the snip point and wetting during delamination. Rip-up of resilient sheet floor material is prohibited.

(iv) All scraping of residual adhesive and/or backing must be performed using wet methods.

(v) Dry sweeping is prohibited.

(vi) Mechanical chipping is prohibited unless performed in a negative pressure enclosure which meets the requirements of subsection (7)(a) of this section.

(vii) Tiles must be removed intact, unless the employer demonstrates that intact removal is not possible.

(viii) When tiles are heated and can be removed intact, wetting may be omitted.

(ix) Resilient flooring material including associated mastic and backing must be assumed to be asbestos-containing unless an industrial hygienist determines that it is asbestos-free using recognized analytical techniques.

(b) For removing roofing material which contains ACM the employer must ensure that the following work practices are followed:

(i) Roofing material must be removed in an intact state to the extent feasible.

(ii) Wet methods must be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards.

(iii) Cutting machines must be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.

(iv) When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operation must be collected by a HEPA dust collector, or must be HEPA vacuumed by vacuuming along the cut line. When removing built-up roofs with asbestos-containing roofing felts and a smooth surface using a power roof cutter, the dust resulting from the cutting operation must be collected either by a HEPA dust collector or HEPA vacuuming along the cut line, or by gently sweeping and then carefully and completely wiping up the still wet dust and debris left along the cut line. The dust and debris must be immediately bagged or placed in covered containers.

(v) Asbestos-containing material that has been removed from a roof must not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it must be lowered to the ground via covered, dust-tight chute, crane or hoist:

(A) Any ACM that is not intact must be lowered to the

ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof it must either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.

(B) Intact ACM must be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.

(vi) Upon being lowered, unwrapped material must be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.

(vii) Roof level heating and ventilation air intake sources must be isolated or the ventilation system must be shut down.

(viii) Notwithstanding any other provision of this section, removal or repair of sections of intact roofing less than 25 square feet in area does not require use of wet methods or HEPA vacuuming as long as manual methods which do not render the material nonintact are used to remove the material and no visible dust is created by the removal method used. In determining whether a job involves less than 25 square feet, the employer must include all removal and repair work performed on the same roof on the same day.

(c) When removing cementitious asbestos-containing siding and shingles or transite panels containing ACM on building exteriors (other than roofs, where subsection (10)(b) of this section applies) the employer must ensure that the following work practices are followed:

(i) Cutting, abrading or breaking siding, shingles, or transite panels, must be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release cannot be used.

(ii) Each panel or shingle must be sprayed with amended water prior to removal.

(iii) Unwrapped or unbagged panels or shingles must be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.

(iv) Nails must be cut with flat, sharp instruments.

(d) When removing gaskets containing ACM, the employer must ensure that the following work practices are followed:

(i) If a gasket is visibly deteriorated and unlikely to be removed intact, removal must be undertaken within a glove bag as described in subsection (7)(b) of this section.

(ii) (Reserved.)

(iii) The gasket must be immediately placed in a disposal container.

(iv) Any scraping to remove residue must be performed wet.

(e) When performing any other Class II removal of asbestos-containing material for which specific controls have not been

listed in subsection (10) of this section, the employer must ensure that the following work practices are complied with.

(i) The material must be thoroughly wetted with amended water prior to and during its removal.

(ii) The material must be removed in an intact state unless the employer demonstrates that intact removal is not possible.

(iii) Cutting, abrading or breaking the material must be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release are not feasible.

(iv) Asbestos-containing material removed, must be immediately bagged or wrapped, or kept wet until transferred to a closed receptacle, no later than the end of the work shift.

(f) Alternative work practices and controls. Instead of the work practices and controls listed in subsection (10) of this section, the employer may use different or modified engineering and work practice controls if the following provisions are complied with.

(i) The employer must demonstrate by data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used, that employee exposure will not exceed the PELs under any anticipated circumstances.

(ii) A competent person must evaluate the work area, the projected work practices and the engineering controls, and must certify in writing, that the different or modified controls are adequate to reduce direct and indirect employee exposure to below the PELs under all expected conditions of use and that the method meets the requirements of this standard. The evaluation must include and be based on data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used for the current job, and by employees whose training and experience are equivalent to employees who are to perform the current job.

(11) Work practices and engineering controls for Class III asbestos work. Class III asbestos work must be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees.

(a) The work must be performed using wet methods.

(b) To the extent feasible, the work must be performed using local exhaust ventilation.

(c) Where the disturbance involves drilling, cutting, abrading, sanding, chipping, braking, or sawing of thermal system insulation or surfacing material, the employer must use impermeable dropcloths, and must isolate the operation using mini-enclosures or glove bag systems according to subsection (7) of this section or another isolation method.

(d) Where the employer does not produce a "negative exposure assessment" for a job, or where monitoring results show

the PEL has been exceeded, the employer must contain the area using impermeable dropcloths and plastic barriers or their equivalent, or must isolate the operation using a control system listed in and in compliance with subsection (7) of this section.

(e) Employees performing Class III jobs, which involve the disturbance of thermal system insulation or surfacing material, or where the employer does not produce a "negative exposure assessment" or where monitoring results show a PEL has been exceeded, must wear respirators which are selected, used and fitted according to provisions of WAC 296-62-07715.

(12) Class IV asbestos work. Class IV asbestos jobs must be conducted by employees trained according to the asbestos awareness training program set out in WAC 296-62-07722. In addition, all Class IV jobs must be conducted in conformity with the requirements set out in this section, mandating wet methods, HEPA vacuums, and prompt clean up of debris containing ACM and PACM.

(a) Employees cleaning up debris and waste in a regulated area where respirators are required must wear respirators which are selected, used and fitted according to provisions of WAC 296-62-07715.

(b) Employers of employees who clean up waste and debris in, and employers in control of, areas where friable thermal system insulation or surfacing material is accessible, must assume that such waste and debris contain asbestos.

(13) Alternative methods of compliance for installation, removal, repair, and maintenance of certain roofing and pipeline coating materials. Notwithstanding any other provision of this section, an employer who complies with all provisions of subsection (10)(a) and (b) of this section when installing, removing, repairing, or maintaining intact pipeline asphaltic wrap, or roof flashings which contain asbestos fibers encapsulated or coated by bituminous or resinous compounds will be deemed to be in compliance with this section. If an employer does not comply with all provisions of this subsection (13), or if during the course of the job the material does not remain intact, the provisions of subsection (10) of this section apply instead of this subsection (13).

(a) Before work begins and as needed during the job, a competent person who is capable of identifying asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and who has the authority to take prompt corrective measures to eliminate such hazards, must conduct an inspection of the worksite and determine that the roofing material is intact and will likely remain intact.

(b) All employees performing work covered by this subsection (13) must be trained in a training program that meets the requirements of WAC 296-62-07722.

(c) The material must not be sanded, abraded, or ground.

When manual methods are used, materials must stay intact.

(d) Material that has been removed from a roof must not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it must be lowered to the ground via covered, dust-tight chute, crane or hoist. All such material must be removed from the roof as soon as is practicable, but in any event no later than the end of the work shift.

(e) Where roofing products which have been labeled as containing asbestos pursuant to WAC 296-62-07721, installed on nonresidential roofs during operations covered by this subsection (13), the employer must notify the building owner of the presence and location of such materials no later than the end of the job.

(f) All removal or disturbance of pipeline asphaltic wrap must be performed using wet methods.

AMENDATORY SECTION (Amending WSR 97-19-014, filed 9/5/97, effective 11/5/97)

WAC 296-62-07725 Medical surveillance. (1) General.

(a) Employees covered. The employer shall institute a medical surveillance program for all employees who are or will be exposed to airborne concentrations of fibers of asbestos at or above the permissible exposure limits. Exception.

Employers in the construction or shipyard industries shall institute a medical surveillance program for all employees who for a combined total of 30 or more days per year are engaged in Class I, II, and III work, or are exposed at or above the permissible exposure limit for combined 30 days or more per year; or who are required by the standard to wear negative pressure respirators. For the purpose of this subsection, any day in which an employee engaged in Class II or III work or a combination thereof for one hour or less (taking into account the entire time spent on the removal operation, including cleanup), and, while doing so adheres to the work practices specified in this standard, shall not be counted.

(b) Examination by a physician.

(i) The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee and at a reasonable time and place.

(ii) Persons other than licensed physicians, who administer the pulmonary function testing required by this section, shall complete a training course in spirometry sponsored by an

appropriate academic or professional institution.

(2) Preplacement examinations.

(a) Except as provided by WAC 296-62-07725 (1)(a), before an employee is assigned to an occupation exposed to airborne concentrations of asbestos, a preplacement medical examination shall be provided or made available by the employer. Examinations administered using the thirty or more days per year criteria of WAC 296-62-07725 (1)(a) shall be given within ten working days following the thirtieth day of exposure. Examinations must be given prior to assignment of employees to areas where negative-pressure respirators are worn.

(b) All examinations shall include, as a minimum, a medical and work history: A complete physical examination of all systems with special emphasis on the pulmonary, cardiovascular, and gastrointestinal systems; completion of the respiratory disease standardized questionnaire in WAC 296-62-07741, Appendix D, Part 1; a chest roentgenogram (posterior-anterior 14x17 inches); pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV_{1.0}); and any additional tests deemed appropriate by the examining physician. Interpretation and classification of chest roentgenograms shall be conducted in accordance with WAC 296-62-07743, Appendix E.

(3) Periodic examinations.

(a) Periodic medical examinations shall be made available annually.

(b) The scope of the medical examination shall be in conformance with the protocol established in subsection (2)(b) of this section, except that the frequency of chest roentgenograms shall be conducted in accordance with Table 2 of this section, and the abbreviated standardized questionnaire contained in WAC 296-62-07741, Appendix D, Part 2, shall be administered to the employee.

TABLE 2--FREQUENCY OF CHEST ROENTGENOGRAMS

Years since first exposure		Age of employee	
	15 to 35	35+ to 45	45+
0 to 10	Every 5 years	Every 5 years	Every 5 years.
10+	Every 5 years	Every 2 years	Every 1 year.

(c) If the examining physician determines that any of the examinations should be provided more frequently than specified, the employer shall provide such examinations to affected employees at the frequencies specified by the physician.

(4) Termination of employment examinations.

(a) The employer shall provide, or make available, a

termination of employment medical examination for any employee who has been exposed to airborne concentrations of fibers of asbestos at or above the permissible exposure limits.

(b) The medical examination shall be in accordance with the requirements of the periodic examinations stipulated in subsection (3) of this section, and shall be given within thirty calendar days before or after the date of termination of employment.

(5) Recent examinations. No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with subsection (2), (3), or (4) of this section within the past one-year period.

(6) Information provided to the physician. The employer shall provide the following information to the examining physician:

(a) A copy of this standard and Appendices D, E, and H of WAC 296-62-07741, 296-62-07743, and 296-62-07749 respectively.

(b) A description of the affected employee's duties as they relate to the employee's exposure.

(c) The employee's representative exposure level or anticipated exposure level.

(d) A description of any personal protective and respiratory equipment used or to be used.

(e) Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

(7) Physician's written opinion.

(a) The employer shall obtain a written (~~signed~~) opinion from the examining physician. This written opinion shall contain the results of the medical examination and shall include:

(i) The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;

(ii) Any recommended limitations on the employee or upon the use of personal protective equipment such as clothing or respirators;

(iii) A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions resulting from asbestos exposure that require further explanation or treatment; and

(iv) A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.

(b) The employer shall instruct the physician not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos.

(c) The employer shall provide a copy of the physician's

written opinion to the affected employee within thirty days from its receipt.

AMENDATORY SECTION (Amending WSR 03-06-076, filed 3/4/03, effective 8/1/03)

WAC 296-78-835 Vehicles. (1) Vehicles.

(a) Scope. Vehicles shall include all mobile equipment normally used in sawmill, planing mill, storage, shipping, and yard operations, including log sorting yards.

(b) Lift trucks. Lift truck shall be designed, constructed, maintained and operated in accordance with the requirements of WAC 296-24-230 through 296-24-23035 of the general safety and health standards.

(c) Carriers. Drive chains on lumber carriers shall be adequately guarded to prevent contact at the pinch points.

(d)(i) Lumber carriers shall be so designed and constructed that the operator's field of vision shall not be unnecessarily restricted.

(ii) Carriers shall be provided with ladders or equivalent means of access to the operator's platform or cab.

(e) Lumber hauling trucks.

(i) On trucks where the normal operating position is ahead of the load in the direction of travel, the cab shall be protected by a barrier at least as high as the cab. The barrier shall be capable of stopping the weight of the load capacity of the vehicle if the vehicle were to be stopped suddenly while traveling at its normal operating speed. The barrier shall be constructed in such a manner that individual pieces of a normal load will not go through openings in the barrier.

(ii) Stakes, stake pockets, racks, tighteners, and binders shall provide a positive means to secure the load against any movement during transit.

(iii) Where rollers are used, at least two shall be equipped with locks which shall be locked when supporting loads during transit.

(2) Warning signals and spark arrestors. All vehicles shall be equipped with audible warning signals and where practicable shall have spark arrestors.

(3) Flywheels, gears, sprockets and chains and other exposed parts that constitute a hazard to workers shall be enclosed in standard guards.

(4) All vehicles operated after dark or in any area of reduced visibility shall be equipped with head lights and backup lights which adequately illuminate the direction of travel for the normal operating speed of the vehicle. The vehicle shall also be equipped with tail lights which are visible enough to

give sufficient warning to surrounding traffic at the normal traffic operating speed.

(5) All vehicles operated in areas where overhead hazards exist shall be equipped with an overhead guard for the protection of the operator.

(6) Where vehicles are so constructed and operated that there is a possibility of the operator being injured by backing into objects, a platform guard shall be provided and so arranged as not to hinder the exit of the driver.

(7) Trucks, lift trucks and carriers shall not be operated at excessive rates of speed. When operating on tramways or docks more than six feet above the ground or lower level they shall be limited to a speed of not more than twelve miles per hour. When approaching blind corners they shall be limited to four miles per hour.

(8) Vehicles shall not be routed across principal thoroughfares while employees are going to or from work unless pedestrian lanes are provided.

(a) Railroad tracks and other hazardous crossings shall be plainly posted (~~(and traffic control devices (American National Standard D8.1 1967 for Railroad Highway Grade Crossing Protection) should be utilized)~~).

(b) Restricted overhead clearance. All areas of restricted side or overhead clearance shall be plainly marked.

(c) Pickup and unloading points. Pickup and unloading points and paths for lumber packages on conveyors and transfers and other areas where accurate spotting is required, shall be plainly marked and wheel stops provided where necessary.

(d) Aisles, passageways, and roadways. Aisles, passageways, and roadways shall be sufficiently wide to provide safe side clearance. One-way aisles may be used for two-way traffic if suitable turnouts are provided.

(9) Where an operator's vision is impaired by the vehicle or load it is carrying, he shall move only on signal from someone so stationed as to have a clear view in the direction the vehicle is to travel.

(10) Lift trucks shall be equipped, maintained and operated in compliance with the requirements of the general safety and health standard, WAC 296-24-230 through 296-24-23035.

(11) Load limits. No vehicle shall be operated with loads exceeding its safe load capacity.

(12) Vehicles with internal combustion engines shall not be operated in enclosed buildings or buildings with ceilings less than sixteen feet high unless the buildings have ventilation adequate to maintain air quality as required by the general occupational health standard, chapter 296-62 WAC.

(13) Vehicles shall not be refueled while motor is running. Smoking or open flames shall not be allowed in the refueling area.

(14) No employee other than trained operators or mechanics shall start the motor of, or operate any log or lumber handling vehicle.

(15) All vehicles shall be equipped with brakes capable of holding and controlling the vehicle and capacity load upon any grade or incline over which they may operate.

(16) Unloading equipment and facilities.

(a) Machines used for hoisting, unloading, or lowering logs shall be equipped with brakes capable of controlling or holding the maximum load in midair.

(b) The lifting cylinders of all hydraulically operated log handling machines, or where the load is lifted by wire rope, shall be equipped with a positive device for preventing the uncontrolled lowering of the load or forks in case of a failure in the hydraulic system.

(c) A limit switch shall be installed on powered log handling machines to prevent the lift arms from traveling too far in the event the control switch is not released in time.

(d) When forklift-type machines are used to load trailers, a means of securing the loading attachment to the fork shall be installed and used.

(e) A-frames and similar log unloading devices shall have adequate height to provide safe clearance for swinging loads and to provide for adequate crotch lines and spreader bar devices.

(f) Log handling machines used to stack logs or lift loads above operator's head shall be equipped with overhead protection.

(g) Unloading devices shall be equipped with a horn or other plainly audible signaling device.

(h) Movement of unloading equipment shall be coordinated by audible or hand signals when operator's vision is impaired or operating in the vicinity of other employees.

Lift trucks regularly used for transporting peeler blocks or cores shall have tusks or a similar type hold down device to prevent the blocks or cores from rolling off the forks.

(17) Where spinners are used on steering wheels, they shall be of the automatic retracting type or shall be built into the wheel in such a manner as not to extend above the plane surface of the wheel. Vehicles equipped with positive antikickback steering are exempted from this requirement.

(18) Mechanical stackers and unstackers shall have all gears, sprockets and chains exposed to the contact of workers, fully enclosed by guards as required by WAC 296-78-710 of this chapter.

(19) Manually operated control switches shall be properly identified and so located as to be readily accessible to the operator. Main control switches shall be so designed that they can be locked in the open position.

(20) Employees shall not stand or walk under loads being

lifted or moved. Means shall be provided to positively block the hoisting platform when employees must go beneath the stacker or unstacker hoist.

(21) No person shall ride any lift truck or lumber carrier unless a suitable seat is provided, except for training purposes.

(22) Unstacking machines shall be provided with a stopping device which shall at all times be accessible to at least one employee working on the machine.

(23) Floor of unstacker shall be kept free of broken stickers and other debris. A bin or frame shall be provided to allow for an orderly storage of stickers.

(24) Drags or other approved devices shall be provided to prevent lumber from running down on graders.

(25) Liquified petroleum gas storage and handling. Storage and handling of liquified petroleum gas shall be in accordance with the requirements of WAC 296-24-475 through 296-24-47517 of the general safety and health standards.

(26) Flammable liquids. Flammable liquids shall be stored and handled in accordance with WAC 296-24-330 through 296-24-33019 of the general safety and health standards.

(27) Guarding side openings. The hoistway side openings at the top level of the stacker and unstacker shall be protected by enclosures of standard railings.

(28) Guarding hoistway openings. When the hoist platform or top of the load is below the working platform, the hoistway openings shall be guarded.

(29) Guarding lower landing area. The lower landing area of stackers and unstackers shall be guarded by enclosures that prevent entrance to the area or pit below the hoist platform. Entrances should be protected by electrically interlocked gates which, when open, will disconnect the power and set the hoist brakes. When the interlock is not installed, other positive means of protecting the entrance shall be provided.

(30) Lumber lifting devices. Lumber lifting devices on all stackers shall be designed and arranged so as to minimize the possibility of lumber falling from such devices.

(31) Inspection. At the start of each work shift, equipment operators shall inspect the equipment they will use for evidence of failure or incipient failure. Equipment found to have defects which might affect the operating safety shall not be used until the defects are corrected.

(32) Cleaning pits. Safe means of entrance and exit shall be provided to permit cleaning of pits.

(33) Preventing entry to hazardous area. Where the return of trucks from unstacker to stacker is by mechanical power or gravity, adequate signs, warning devices, or barriers shall be erected to prevent entry into the hazardous area.

AMENDATORY SECTION (Amending WSR 95-04-007, filed 1/18/95, effective 3/1/95)

WAC 296-155-100 Management's responsibility. (1) It shall be the responsibility of management to establish, supervise, and enforce, in a manner which is effective in practice:

(a) A safe and healthful working environment.

(b) An accident prevention program as required by these standards.

(c) Training programs to improve the skill and competency of all employees in the field of occupational safety and health.

(2) Employees required to handle or use poisons, caustics, and other harmful substances shall be instructed regarding the safe handling and use, and be made aware of the potential hazards, personal hygiene, and personal protective measures required.

(3) In job site areas where harmful plants or animals are present, employees who may be exposed shall be instructed regarding the potential hazards, and how to avoid injury, and the first-aid procedures to be used in the event of injury.

(4) Employees required to handle or use flammable liquids, gases, or toxic materials shall be instructed in the safe handling and use of these materials and made aware of the specific requirements contained in Parts B, D, and other applicable parts of this standard.

(5) Permit-required confined spaces. The requirements of chapters 296-24, 296-62 and 296-155 WAC apply.

(6) The employer shall ensure that work assignments place no employee in a position or location not within ordinary calling distance of another employee able to render assistance in case of emergency.

Note: This subsection does not apply to operators of motor vehicles, watchpersons or other jobs which, by their nature, are single employee assignments. However, a definite procedure for checking the welfare of all employees during working hours should be instituted and all employees so advised.

(7) Each employer shall post and keep posted a notice or notices (Job Safety and Health Protection - Form ((~~F416-081-000~~) F416-081-909) to be furnished by the department of labor and industries, informing employees of the protections and obligations provided for in the act and that for assistance and information, including copies of the act, and of specific safety and health standards employees should contact the employer or the nearest office of the department of labor and industries. Such notice or notices shall be posted by the employer at each establishment in a conspicuous place or places where notices to employees are customarily posted. Each employer shall take

steps to assure that such notices are not altered, defaced, or covered by other material.

AMENDATORY SECTION (Amending WSR 01-11-038, filed 5/9/01, effective 9/1/01)

WAC 296-155-125 First-aid supplies. (1) The first-aid kits and supplies requirements of the safety and health core rules, chapter 296-800 WAC, apply within the scope of chapter 296-155 WAC.

(2) All vehicles used to transport work crews must be equipped with first-aid supplies.

(3) When practical, a poster must be fastened and maintained either on or in the cover of each first-aid kit and at or near all phones plainly stating the worksite address or location, and the phone numbers of emergency medical responders for the worksite.

(4) Requirements of WAC ((~~296-62-130, Emergency washing facilities~~)) 296-800-15030, Make sure emergency washing facilities are functional and readily accessible, apply within the scope of chapter 296-155 WAC.

AMENDATORY SECTION (Amending Order 92-15, filed 2/3/93, effective 3/15/93)

WAC 296-155-17311 Exposure monitoring. (1) General.

(a) Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's exposure to airborne MDA over an 8-hour period. Determination of employee exposure to the STEL shall be made from breathing zone air samples collected over a 15 minute sampling period.

(b) Representative employee exposure shall be determined on the basis of one or more samples representing full shift exposure for each shift for each job classification in each work area where exposure to MDA may occur.

(c) Where the employer can document that exposure levels are equivalent for similar operations in different work shifts, the employer shall only be required to determine representative employee exposure for that operation during one shift.

(2) Initial monitoring. Each employer who has a workplace or work operation covered by this standard shall perform initial

monitoring to determine accurately the airborne concentrations of MDA to which employees may be exposed unless:

(a) The employer can demonstrate, on the basis of objective data, that the MDA-containing product or material being handled cannot cause exposures above the standard's action level, even under worst-case release conditions; or

(b) The employer has historical monitoring or other data demonstrating that exposures on a particular job will be below the action level.

(3) Periodic monitoring and monitoring frequency.

(a) If the monitoring required by subsection (2)(b) of this section reveals employee exposure at or above the action level, but at or below the PELs, the employer shall repeat such monitoring for each such employee at least every 6 months.

(b) If the monitoring required by subsection (2)(b) of this section reveals employee exposure above the PELs, the employer shall repeat such monitoring for each such employee at least every 3 months.

(c) Employers who are conducting MDA operations within a regulated area can forego periodic monitoring if the employees are all wearing supplied-air respirators while working in the regulated area.

(d) The employer may alter the monitoring schedule from every three months to every six months for any employee for whom two consecutive measurements taken at least 7 days apart indicate that the employee exposure has decreased to below the PELs but above the action level.

(4) Termination of monitoring.

(a) If the initial monitoring required by subsection (2)(b) of this section reveals employee exposure to be below the action level, the employer may discontinue the monitoring for that employee, except as otherwise required by subsection (5) of this section.

(b) If the periodic monitoring required by subsection (3) of this section reveals that employee exposures, as indicated by at least two consecutive measurements taken at least 7 days apart, are below the action level the employer may discontinue the monitoring for that employee, except as otherwise required by subsection (5) of this section.

(5) Additional monitoring. The employer shall institute the exposure monitoring required under subsections (2)(b) and (c) of this section when there has been a change in production process, chemicals present, control equipment, personnel, or work practices which may result in new or additional exposures to MDA, or when the employer has any reason to suspect a change which may result in new or additional exposures.

(6) Accuracy of monitoring. Monitoring shall be accurate, to a confidence level of 95 percent, to within plus or minus 25 percent for airborne concentrations of MDA.

(7) Employee notification of monitoring results.

(a) The employer shall, (~~within 15~~) as soon as possible but no later than 5 working days after the receipt of the results of any monitoring performed under this standard, notify each employee of these results, in writing, either individually or by posting of results in an appropriate location that is accessible to affected employees.

(b) The written notification required by subdivision (a) of this subsection shall contain the corrective action being taken by the employer or any other protective measures which have been implemented to reduce the employee exposure to or below the PELs, wherever the PELs are exceeded.

(8) Visual monitoring. The employer shall make routine inspections of employee hands, face, and forearms potentially exposed to MDA. Other potential dermal exposures reported by the employee must be referred to the appropriate medical personnel for observation. If the employer determines that the employee has been exposed to MDA the employer shall:

(a) Determine the source of exposure;

(b) Implement protective measures to correct the hazard;
and

(c) Maintain records of the corrective actions in accordance with WAC 296-155-17327.

AMENDATORY SECTION (Amending WSR 04-24-089, filed 12/1/04, effective 1/1/05)

WAC 296-155-305 Signaling and flaggers.

Definition:

Flagger means a person who provides temporary traffic control.

For the purposes of this chapter, *MUTCD* means the Federal Highway Administration's Manual on Uniform Traffic Control as currently modified and adopted by the Washington state department of transportation.

Link: For the current version of the MUTCD, see the department of transportation's web site at <http://www.wsdot.wa.gov/biz/trafficoperations/mutcd.htm>.

(1) General requirements for signaling and flaggers.

(a) (~~When flaggers are used,~~) Employers must first apply the requirements in this section. Then you must set up and use temporary traffic controls according to the guidelines and recommendations in Part VI of the MUTCD.

(b) Job site workers with specific traffic control responsibilities must be trained in traffic control techniques, device usage, and placement.

Note:

✍ You may purchase copies of the MUTCD by writing:

U.S. Government Printing Office
Superintendent of Documents
Mail Stop: SSOP,
Washington D.C. 20402-9328

✍ You may view and print a copy of the MUTCD at the following web site
<http://www.wsdot.wa.gov/biz/trafficoperations/mutcd.htm>.

(2) When to use flaggers.

(a) Flaggers are to be used only when other reasonable traffic control methods will not adequately control traffic in the work zone.

(b) If signs, signals, and barricades do not provide necessary protection from traffic at work zones and construction sites on or adjacent to a highway or street, then you must use flaggers or other appropriate traffic controls.

(3) Flagger signaling.

(a) Flagger signaling must be with sign paddles approved by WSDOT and conform to guidelines and recommendations of MUTCD.

(b) Sign paddles must comply with the requirements of the MUTCD.

(c) When flagging is done during periods of darkness, sign paddles must be retroreflective or illuminated in the same manner as signs.

(d) During emergency situations, red flags, meeting the specifications of the MUTCD, may be used to draw a driver's attention to particularly hazardous conditions. In nonemergency situations, a red flag may be held in a flagger's free hand to supplement the use of a sign paddle.

(4) Adequate warning of approaching vehicles. Employers must:

✍ Position work zone flaggers so they are not exposed to traffic or equipment approaching them from behind.

- If this is not possible, then the employer, responsible contractor, and/or project owner must develop and use a method to ensure that flaggers have adequate visual warning of traffic and equipment approaching from behind.

Note: ✍ The following are some optional examples of methods that may be used to adequately warn or protect flaggers:
- Mount a mirror on the flagger's hard hat.
- Use an observer.
- Use "jersey" barriers.

✍ The department recognizes the importance of adequately trained flaggers and supports industry efforts to improve the quality of flagger training. However, training alone is not sufficient to comply with the statutory requirement of revising flagger safety standards to improve options available that ensure flagger safety and that flaggers have adequate visual warning of objects approaching from behind them.

(5) High-visibility garments for flaggers.

(a) While flagging during daylight hours, a flagger must at least wear, as an outer garment:

✍ A high-visibility safety garment designed according to Class 2 specifications in ANSI/ISEA 107-1999, American National Standard for High-Visibility Safety Apparel.

- Consisting of at least 775 square inches of background material that are fluorescent yellow-green, fluorescent orange-red or fluorescent red in color;

AND

- 201 square inches of retroreflective material that encircles the torso and is placed to provide 360 degrees visibility around the flagger.

✍ A high visibility hard hat that is white, yellow, yellow-green, orange or red in color.

Note: A high-visibility garment meets Class 2 specifications if the garment:

✍ Meets the requirements above;

OR

✍ Has an ANSI "Class 2" label.

Definition:

For the purpose of this rule, **hours of darkness** means one-half hour before sunset to one-half hour after sunrise.

(b) While flagging during hours of darkness, a flagger must at least wear, as an outer garment:

✍ A high-visibility safety garment designed according to Class 2 specifications in ANSI/ISEA 107-1999.

- Consisting of at least 775 square inches of background material that are fluorescent yellow-green, fluorescent orange-red or fluorescent red in color;

AND

- 201 square inches of retroreflective material that encircles the torso and is placed to provide 360 degrees visibility around the flagger.

✍ White coveralls, or other coveralls or trousers that have retroreflective banding on the legs designed according to ANSI/ISEA 107-1999 standards.

✍ When snow or fog limit visibility, pants, coveralls, or rain gear, meeting these additional requirements must be worn:

- In a highly visible color;

- With retroreflective banding on the legs;

- Designed according to ANSI/ISEA 107-1999.

✍ A high-visibility hard hat:

- Marked with at least 12 square inches of retroreflective material applied to provide 360 degrees of visibility.

Note: ANSI/ISEA 107-1999 is available by:

✍ Purchasing copies of ANSI/ISEA 107-1999 by writing:

- American National Standards Institute

11 West 42nd Street

New York, NY 10036

OR

- Contacting the ANSI web site at <http://web.ansi.org/>.

OR

✍ Reading a copy of ANSI/ISEA 107-1999 at any Washington state library.

(6) Flagger training. Employers must make sure that:

(a) Each flagger has in their possession:

✎ A valid Washington traffic control flagger card; or

✎ A valid flagger card from a state such as:

- Oregon;
- Idaho;
- Montana;

OR

- Other states having a flagger training reciprocity agreement with Washington.

(b) The flagger card shows the following:

✎ Verification that the flagger training required is completed;

✎ Date the flagger received their flagger training;

✎ Name of the instructor providing the flagger training;

✎ Name of the state that issued the flagger card;

✎ The card's expiration date, not to exceed three years from the date of issuance;

AND

✎ The flagger's picture or a statement that says "valid with photo ID."

(c) Flagger training is based upon the MUTCD.

Exemption: Personnel that have not completed a flagger-training course may be assigned duties as flaggers only during emergencies. Emergency assignments are temporary and last only until a certified flagger can be put into the position.

Definition:

For the purpose of this rule, **emergency** means an unforeseen occurrence endangering life, limb, or property.

(7) Flagger orientation and traffic control plan.

(a) The employer, responsible contractor or project owner must conduct an orientation that familiarizes the flagger with the job site. This requirement applies each time the flagger is assigned to a new project or when job site conditions change significantly.

The orientation must include, but is not limited to:

✎ The flagger's role and location on the job site;

✎ Motor vehicle and equipment in operation at the site;

✎ Job site traffic patterns;

✎ Communications and signals to be used between flaggers and equipment operators;

✎ On-foot escape route;

AND

✎ Other hazards specific to the job site.

(b) If flaggers are used on a job that will last more than one day, then the employer, responsible contractor and/or project owner must keep on-site, a current site specific traffic control plan. The purpose of this plan is to help move traffic through or around the construction zone in a way that protects the safety of the traveling public, pedestrians and workers.

The plan must include, but is not limited to, the following items when they are appropriate:

- ✎ Sign use and placement;
- ✎ Application and removal of pavement markings;
- ✎ Construction;
- ✎ Scheduling;
- ✎ Methods and devices for delineation and channelization;
- ✎ Placement and maintenance of devices;
- ✎ Placement of flaggers;
- ✎ Roadway lighting;
- ✎ Traffic regulations;

AND

- ✎ Surveillance and inspection.

(8) Advance warning signs.

(a) Employers must provide the following on all flagging operations:

- ✎ A three sign advance warning sequence on all roadways with a speed limit below 45 mph.

- ✎ A four sign advance warning sequence on all roadways with a 45 mph or higher speed limit.

(b) Warning signs must reflect the actual condition of the work zone. When not in use, warning signs must either be taken down or covered.

(c) Employers must make sure to follow Table 1 for spacing of advance warning sign placement.

Table 1. Advanced Warning Sign Spacing

Road Type	Speed	Distances Between Advance Warning Signs*			
		A**	B**	C**	D**
Freeways & Expressways	70	1,500 ft.+/- or per the MUTCD.	1,500 ft.+/- or per the MUTCD.	1,500 ft.+/- or per the MUTCD.	1,500 ft.+/- or per the MUTCD.
	55				
Rural Highways	65	1,000 ft.+/-	1,000 ft.+/-	1,000 ft.+/-	1,000 ft.+/-
	60				
Rural Roads	55	500 ft.+/-	500 ft.+/-	500 ft.+/-	500 ft.+/-
	45				
Rural Roads and Urban Arterials	40	350 ft.+/-	350 ft.+/-	350 ft.+/-	N/A
	35				
Rural Roads, Urban Streets, Residential Business Districts	30	200 ft.***	200 ft.***	200 ft.***	N/A
	25				
Urban Streets	25	100 ft.***	100 ft.***	100 ft.***	N/A
	or less				

*All spacing may be adjusted to accommodate interchange ramps, at-grade intersections, and driveways.

**This refers to the distance between advance warning signs. See Figure 1, Typical Lane Closure on Two-Lane Road. This situation is

typical for roadways with speed limits less than 45 mph.

***This spacing may be reduced in urban areas to fit roadway conditions.

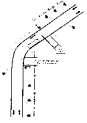
Exemption: In a mobile flagging operation, as defined by the MUTCD when the flagger is moving with the operation, the "flagger ahead (symbol or text)" sign must be:

✍ Within 1,500 feet of the flagger;

AND

✍ The flagger station must be seen from the sign.

If terrain does not allow a motorist to see the flagger from the "flagger ahead" sign, the distance between the flagger and the sign must be shortened to allow visual contact, but in no case can the distance be less than the distance specified in Table 1, Advanced Warning Sign Spacing.



(9) Providing a safe job site for flaggers. Employers, responsible contractors and/or project owners must make sure that:

(a) Flagger stations are located far enough in advance of

the work space so that the approaching road users will have sufficient distance to stop before entering the work space. Follow Table 2 for the distance of the flagger workstation in advance of the work space.

Table 2. Distance of Flagger Station in Advance of the Work Space

Speed* (mph)	Distance (ft)**
20	35
25	55
30	85
35	120
40	170
45	220
50	280
55	335
60	415
65	485

*Posted speed, off-peak 85th-percentile speed prior to work starting or the anticipated operating speed.

**This spacing may be reduced to fit roadway and worksite conditions. Distances greater than those listed in the table are acceptable.

(b) Flaggers stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger must only stand in the lane being used by moving road users after road users have stopped.

Definition:

Road user means a vehicle operator, bicyclist, or pedestrian within a public roadway, including workers in temporary traffic control zones.


(c) Flagger workstations are illuminated during hours of darkness by floodlights that do not create glare that poses a hazard for drivers.


Note: To identify potential glare, observe the lighted area from various directions and angles on the main roadway after initial floodlight setup.

Exemption: Emergency situations are exempt from these illumination requirements. For the purpose of this rule, *emergency* means an unforeseen occurrence endangering life, limb, or property.

(d) Flaggers are not assigned other duties while engaged in flagging activities.

(e) Flaggers do not use devices that may distract the flagger's vision, hearing, or attention.

 Examples of these devices include cell phones, pagers, radios, and headphones.

 Devices such as two-way radios used for communications between flaggers to direct traffic or ensure flagger safety are acceptable.

(f) Flaggers receive a rest period of at least ten minutes, on the employer's time, for each four hours of working time.

✎ Rest periods must be scheduled as near as possible to the midpoint of the work period.

✎ A flagger must not be allowed to work more than three hours without a rest period.

Exemption: Scheduled rest periods are not required where the nature of the work allows a flagger to take intermittent rest periods equivalent to ten minutes for each four hours worked.

AMENDATORY SECTION (Amending Order 88-04, filed 5/11/88)

WAC 296-155-452 Specific purpose equipment and installations. (1) Cranes and hoists. This subsection applies to the installation of electric equipment and wiring used in connection with cranes, monorail hoists, hoists, and all runways.

(a) Disconnecting means.

(i) Runway conductor disconnecting means. A readily accessible disconnecting means shall be provided between the runway contact conductors and the power supply.

(ii) Disconnecting means for cranes and monorail hoists. A disconnecting means, capable of being locked in the open position, shall be provided in the leads from the runway contact conductors or other power supply on any crane or monorail hoist.

(A) If this additional disconnecting means is not readily accessible from the crane or monorail hoist operating station, means shall be provided at the operating station to open the power circuit to all motors of the crane or monorail hoist.

(B) The additional disconnect may be omitted if a monorail hoist or hand-propelled crane bridge installation meets all of the following:

(I) The unit is floor controlled;

(II) The unit is within view of the power supply disconnecting means; and

(III) No fixed work platform has been provided for servicing the unit.

(b) Control. A limit switch or other device shall be provided to prevent the load block from passing the safe upper limit of travel of any hoisting mechanism.

(c) Clearance. The dimension of the working space in the direction of access to live parts which may require examination, adjustment, servicing, or maintenance while alive shall be a minimum of 2 feet 6 inches (762 mm). Where controls are enclosed in cabinets, the door(s) shall open at least 90 degrees or be removable, or the installation shall provide equivalent

access.

(d) Grounding. All exposed metal parts of cranes, monorail hoists, hoists and accessories including pendant controls shall be metallically joined together into a continuous electrical conductor so that the entire crane or hoist will be grounded in accordance with WAC ((~~296-155-434~~)) 296-155-447(6). Moving parts, other than removable accessories or attachments, having metal-to-metal bearing surfaces shall be considered to be electrically connected to each other through the bearing surfaces for grounding purposes. The trolley frame and bridge frame shall be considered as electrically grounded through the bridge and trolley wheels and its respective tracks unless conditions such as paint or other insulating materials prevent reliable metal-to-metal contact. In this case a separate bonding conductor shall be provided.

(2) Elevators, escalators, and moving walks.

(a) Disconnecting means. Elevators, escalators, and moving walks shall have a single means for disconnecting all ungrounded main power supply conductors for each unit.

(b) Control panels. If control panels are not located in the same space as the drive machine, they shall be located in cabinets with doors or panels capable of being locked closed.

(3) Electric welders--disconnecting means.

(a) Motor-generator, AC transformer, and DC rectifier arc welders. A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder.

(b) Resistance welders. A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means shall not be less than the supply conductor ampacity.

(4) X-ray equipment.

(a) Disconnecting means.

(i) General. A disconnecting means shall be provided in the supply circuit. The disconnecting means shall be operable from a location readily accessible from the X-ray control. For equipment connected to a 120-volt branch circuit of 30 amperes or less, a grounding-type attachment plug cap and receptacle of proper rating may serve as a disconnecting means.

(ii) More than one piece of equipment. If more than one piece of equipment is operated from the same high-voltage circuit, each piece or each group of equipment as a unit shall be provided with a high-voltage switch or equivalent disconnecting means. This disconnecting means shall be constructed, enclosed, or located so as to avoid contact by employees with its live parts.

(b) Control-radiographic and fluoroscopic types.

Radiographic and fluoroscopic-type equipment shall be effectively enclosed or shall have interlocks that deenergize the equipment automatically to prevent ready access to live current-carrying parts.

AMENDATORY SECTION (Amending Order 91-07, filed 11/22/91, effective 12/24/91)

WAC 296-155-476 General requirements. (1) A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches (48 cm) or more, and no ramp, runway, sloped embankment, or personnel hoist is provided.

(a) Employees shall not use any spiral stairways that will not be a permanent part of the structure on which construction work is being performed.

(b) A double-cleated ladder or two or more separate ladders shall be provided when ladders are the only means of access or exit from a working area for 25 or more employees, or when a ladder is to serve simultaneous two-way traffic.

(c) When a building or structure has only one point of access between levels, that point of access shall be kept clear to permit free passage of employees. When work must be performed or equipment must be used such that free passage at that point of access is restricted, a second point of access shall be provided and used.

(d) When a building or structure has two or more points of access between levels, at least one point of access shall be kept clear to permit free passage of employees.

(2) Employers shall provide and install all stairway and ladder fall protection systems required by this part and shall comply with all other pertinent requirements of this part before employees begin the work that necessitates the installation and use of stairways, ladders, and their respective fall protection systems.

AMENDATORY SECTION (Amending Order 94-07, filed 7/20/94, effective 9/20/94)

WAC 296-155-545 Conveyors. (1) All conveyors in use shall meet the applicable requirements for design, construction, inspection, testing, maintenance, and operation, as prescribed in ANSI B20.1-1976, Safety Code for Conveyors, Cableways, and Related Equipment.

(2) Starting precautions.

(a) When the entire length of a conveyor is visible from the starting switch, the operator shall visually check to make certain that all persons are in the clear before starting the conveyor.

(b) When the entire length of the conveyor is not visible from the starting switch, a positive audible or visible warning system shall be installed and operated to warn persons that the conveyor will be started.

(c) All reasonable precautions shall be taken by the operator prior to starting a conveyor, to assure that no person is in a hazardous location where they may be injured when the conveyor is started.

(3) Riding and walking on conveyors.

(a) Riding on conveyor chains, belt, or bucket elevators shall be prohibited.

(b) Persons shall not be allowed to walk on conveyors except for emergency purposes and then only after the conveyor has been deenergized and the person can do so safely.

(c) Riding of conveyors shall only be permitted on the manlift steps and platforms with handholds attached and other safety factors as specified in chapter ~~((296-82 WAC, Safety standards for existing belt manlifts))~~ 296-96 WAC, Safety regulations and fees for all elevators, dumbwaiters, escalators, and other conveyances.

(4) Stop controls.

(a) Means for stopping the motor or engine of a conveyor shall be provided at the operator's station.

(b) If the operator's station is at a remote point, similar provisions for stopping the motor or engine shall be provided at the motor or engine location.

(5) Emergency controls. Emergency stop switches shall be arranged so that the conveyor cannot be started again until the actuating stop switch has been reset to running or "on" position.

(6) Screw type conveyors. Screw or auger type conveyors

shall be guarded to prevent employee contact with turning flights.

(7) Overhead conveyors.

(a) Where a conveyor passes over work areas, aisles, or thoroughfares, guards shall be provided to protect persons required to work below the conveyors.

(b) Where a conveyor crosses over an aisle or passageway, it shall be conspicuously marked by suitable signs, as required by Part E of this chapter.

(c) When the return strand of a conveyor operates within seven feet of the floor there shall be a trough provided of sufficient strength to carry the weight resulting from a broken chain. If the strands are over a passageway, a means shall be provided to catch and support the ends of the chain in the event of a break.

(8) Emergency stop.

(a) Conveyors shall be provided with an emergency stopping device (panic-type) which can be reached from the conveyor.

(b) The emergency stopping device shall be located near the material entrance and shall stop the conveyor a sufficient distance away from the hazard to prevent injury.

(c) Where the conveyor leading into such equipment is under constant control of an operator who has full view of the material entrance who is located or restrained where they cannot possibly fall onto the conveyor an emergency stopping device is not mandatory.

(9) Conveyor lockout.

(a) Conveyors shall be locked out with a padlock at any time repair, maintenance, or clean-up work is being performed on the conveyor.

(b) Tags or push-button stops are not acceptable.

(10) Where conveyors are in excess of seven feet in height, means shall be provided to safely permit essential inspection and maintenance operations.

(11) Conveyor repair.

(a) Any part showing signs of significant wear shall be inspected carefully and replaced prior to reaching a condition where it may create a hazard.

(b) Replacement parts shall be equal to or exceed the manufacturer's specifications.

AMENDATORY SECTION (Amending WSR 02-13-115, filed 6/19/02, effective 9/1/02)

WAC 296-155-704 Hoisting and rigging. (1) All the provisions of WAC 296-155-525 and 296-155-526 apply to hoisting and rigging.

(2) In addition, subsections (3) through (5) of this section apply regarding the hazards associated with hoisting and rigging.

(3) **General.**

(a) Crane preshift visual inspection.

(i) Cranes being used in steel erection activities must be visually inspected prior to each shift by a competent person. The inspection must include observation for deficiencies during operation and, as a minimum, must include:

✎ All control mechanisms for maladjustments;

✎ Control and drive mechanism for excessive wear of components and contamination by lubricants, water or other foreign matter;

✎ Safety devices, including boom angle indicators, boom stops, boom kick out devices, anti-two block devices, and load ((movement)) moment indicators where required;

✎ Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation;

✎ Hooks and latches for deformation, chemical damage, cracks, or wear;

✎ Wire rope reeving for compliance with hoisting equipment manufacturer's specifications;

✎ Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, or moisture accumulation;

✎ Hydraulic system for proper fluid level;

✎ Tires for proper inflation and condition;

✎ Ground conditions around the hoisting equipment for proper support, including ground settling under and around outriggers, ground water accumulation, or similar conditions;

✎ The hoisting equipment for level position; and

✎ The hoisting equipment for level position after each move and setup.

(ii) If any deficiency is identified, an immediate determination must be made by the competent person if the deficiency constitutes a hazard.

(iii) If the deficiency constitutes a hazard, the hoisting equipment must be removed from service until the deficiency has

been corrected.

(iv) The operator is responsible for those operations under their direct control. Whenever there is any doubt as to safety, the operator must have the authority to stop and refuse to handle loads until safety has been assured.

(b) A qualified rigger (a rigger who is also a qualified person) must inspect the rigging prior to each shift in accordance with WAC 296-155-330.

(c) The headache ball, hook or load must not be used to transport personnel, except as provided in (d) of this subsection.

(d) Cranes or derricks may be used to hoist employees on a personnel platform when work under this part is being conducted if all the provisions of WAC 296-155-525 through 296-155-528 are met.

(e) Safety latches on hooks must not be deactivated or made inoperable except:

(i) When a qualified rigger has determined that the hoisting and placing of purlins and single joists can be performed more safely by doing so; or

(ii) When equivalent protection is provided in a site-specific erection plan.

(4) Working under loads.

(a) Routes for suspended loads must be preplanned to ensure that no employee works directly below a suspended load except when:

(i) Engaged in the initial connection of the steel; or

(ii) Necessary for the hooking or unhooking of the load.

(b) When working under suspended loads, the following criteria must be met:

(i) Materials being hoisted must be rigged to prevent unintentional displacement;

(ii) Hooks with self-closing safety latches or their equivalent must be used to prevent components from slipping out of the hook; and

(iii) All loads must be rigged by a qualified rigger.

(5) Multiple lift rigging procedure.

(a) A multiple lift must only be performed if the following criteria are met:

✎ A multiple lift rigging assembly is used;

✎ A multiple lift is only permitted when specifically within the manufacturer's specifications and limitations;

✎ A maximum of five members are hoisted per lift;

Exception: Bundles of decking must not be lifted using the multiple lift rigging procedure, even though they meet the definition of structural members in WAC 296-155-702.

✎ Only beams and similar structural members are lifted; and

✎ All employees engaged in the multiple lift have been trained in these procedures in accordance with WAC 296-155-717

(3)(a).

(b) Components of the multiple lift rigging assembly must be specifically designed and assembled with a maximum capacity for total assembly and for each individual attachment point. This capacity, certified by the manufacturer or a qualified rigger, must be based on the manufacturer's specifications with a five to one safety factor for all components.

(c) The total load must not exceed:

✎ The rated capacity of the hoisting equipment specified in the hoisting equipment load charts; and

✎ The rigging capacity specified in the rigging-rating chart.

(d) The multiple lift rigging assembly must be rigged with members:

✎ Attached at their center of gravity and maintained reasonably level;

✎ Rigged from top down; and

✎ Rigged at least seven feet (2.1 m) apart.

(e) The members on the multiple lift rigging assembly must be set from the bottom up.

(f) Controlled load lowering must be used whenever the load is over the connectors.

AMENDATORY SECTION (Amending WSR 02-23-073, filed 11/19/02, effective 1/1/03)

WAC 296-833-30010 Provide adequate water.

You must:

✎ Provide a water supply that is adequate and convenient for:

- Drinking
- Cooking
- Bathing
- Laundry purposes.

✎ Make sure the water supply system is:

- Capable of delivering
 - ✂ Thirty-five gallons per person per day to the campsite
 - ✂ At a peak rate of two and one-half times the average hourly demand

- Able to supply water to all fixtures at the same time with normal operating pressures

- Approved by the appropriate health authority

✎ Supply water to each housing area by either:

- Piping water directly to the shelters
- Providing yard hydrants within one hundred feet of the shelters

✎ Prohibit common drinking cups

✎ Provide one or more drinking fountain(s) for each one hundred occupants (or fraction of that number) where water under pressure is available.

((**Reference:**

~~The construction of drinking fountains must comply with ANSI standard Specifications for Drinking Fountains, Z4.2.1942.))~~

REPEALER

The following section of the Washington Administrative Code
is repealed:

WAC 296-24-21515 Conveyors.